



DOW CHEMICAL U.S.A.

MIDLAND, MICHIGAN 48640

17 March 1981

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Dr. R. Davis, Environmental Hlth. Assoc.
Dr. K. Hatfield, Diamond Shamrock
Dr. V. Kirkland, Shell
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Dr. C. Tamburro, Univ. of Louisville

LIVER ANGIOSARCOMA REGISTRY

John Stafford has updated his extremely useful Registry of Liver Angiosarcoma. Since you may not have gotten a copy, one is enclosed. As indicated, information about a new case was received by John at the last minute. I have taken the liberty of transcribing this information on Tables 1, 2, and 5, as well as page 22. I have not calculated the information in the other tables although obviously changes will need to be made in them as well.

We all owe John a round of thanks for keeping these records. Any information should be sent to John as early as possible.

Sincerely yours,

T. R. Torkelson, Sc.D.
Health and Environmental Sciences, U.S.A.
1803 Building
517/636-5197

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Enclosure

cc: Dr. John Stafford

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AN OPERATING UNIT OF THE DOW CHEMICAL COMPANY

Environmental Affairs

SL 107000

SL 107001

ADDENDUMTO RECIPIENTS OF 6TH FEBRUARY 1981 ASL REGISTER

Soon after I had sent the 6th February 1981 update of the ASL register to be printed, I received the sad news from Dr Gosztanyi Jr that Tenneco Chemicals have had their first ASL death. Dr Gosztanyi, the Corporate Medical Director of Tenneco Chemicals, has given me the following data. Rather than delay the 6th Feb tables by altering and reprinting them, I thought you may wish to make the following addition to page 22.

<u>Country and Ref No</u>	<u>Name or Initials</u>	<u>Date of Birth</u>	<u>Company</u>
US30	WVN	22/07/22	Tenneco

<u>Factory</u>	<u>First VCM Exposure</u>	<u>Date of Diagnosis</u>	<u>Age at Diagnosis</u>
Flemington	11/06/64	(30/12/80) 12/02/81	58

<u>Years of Exposure to Diagnosis</u>	<u>Years of Exposure</u>	<u>Date of Death</u>
16½	6 + 7 9 (minimal)	30/12/80

<u>Histological Confirmation</u>	<u>Estimated Exposure Level</u>	<u>Occupation</u>
Yes	6 years - unknown but varied low to high	6 yrs - maintenance mechanic
	1½ years - ?	1½ yrs - worked elsewhere
	9 years - very low in non regulated area	9 yrs - boiler house operator

This brings the known World Total to 88, US Total to 27 and the 1980 deaths to 5 of which UK had 2 and US 3. This is so far the "youngest" plant to have an ASL case as you will find when you will the data into Table,

These data will be incorporated into the next updated register. I am grateful to Dr Gosztanyi for his extremely prompt and detailed communication.

John Stafford

24th February 1981

*I have entered these changes on
Tables 1, 2, 5 and page 22 only.
J.R. Tabulam March 14, 1981*

Liver Angiosarcoma Cases

Circulation

Dr K S Williamson
Dr G Paddle
Dr D P Duffield
Dr W G F Adams - (5 copies - ICIA, AECI, Duperial)
Mr D W S Beynon/Mr J G Davies/Dr J H Wilson
Dr D W Plester
Mr L F Hill, Millbank
Mr Brian Hasler, Vinatex
Mr A E H Williams, BP
Mr R H Hards, BIP Vinyls
Dr J T Carter, BP
Mr T L Phillips, BP
Dr P Lewis, CIA
Dr J P Tassignon, Solvay
Mr J C Thomas, Rhone-Poulenc
Dr Renzo Mattiussi, Montedison
Mr P Lechaude, Solvay
Dr B List, Lonza
Mr P G Claus, APME
Dr J G Kammuller, Shell
Mr S Wejdling, Kemanord
Mr C Rangnes, Norsk Hydro
Dr Terwiesch, CWH
Mr H Emminger, VKE
Mr P de Voogd, Shell
Dr E Lloyd-Jones, BP
Mr Owen Jones, Hillhouse
Dr Brian Bennett, Hillhouse
Dr Peter Wright, PCD Wilton
Dr F W Best, Everberg
Dr G Norcross, Everberg
Mr G Dupont, APME
Dr C Bishop, EMAS
Mr B Werner, EMAS
Dr Spirtas - NCI/NIH BETHESDA
Ms R Kaminski - NIOSH, Cincinnati
Dr R Owen - TUC
Dr J Stafford (8)

Dr T R Torkelson, Dow
Mr J Lawrence, SPI
Mr J T Seawell, CMA Washington
Mr R N Wheeler, UCC
Dr A Ross Adams, Air Products
Dr Mayo Smith, Air Products
Dr John Barr, Air Products
Dr Walter D Harris, Uniroyal Inc
Dr Robert K Hinderer, BF Goodrich (Cleveland)
Dr R A Krueger, BF Goodrich
Dr M N Johnson, BF Goodrich
Dr J Possberg, Wacker
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Prof. C Maltoni, Bologna
Dr J William Lloyd, Osha
Dr David Bryson, AG Division
Mr S Nakamura, Japanese PVC Association
Dr Peter Baxter, CDC Atlanta
Dr A Munn, Monsanto, Brussels
Dr R E Gosztonyi Jr, Tenneco Chemicals, Saddle Brook (NJ)
Dr Donald W Hillman, Diamond Shamrock
Dr G Kent Hatfield, Diamond Shamrock

JS/MM/D-58
6 February 1981

PREFACE

ACKNOWLEDGEMENTS, SIGNIFICANT CHANGES AND COMMENTS

- 1 French Case 05 was described in yet further detail in La Nouvelle Presse Medicale, 7th July 1979 page 2485. This paper alleges primary rib tumours as well as ASL!
- 2 Canadia Case 06 was described by Delorme in Annales d'Anatomie pathologique, Paris 1978 pp 105-114 which I have seen only recently. Delorme claims that this case had a hepatoma and ASL simultaneously!
- 3 I am grateful to Dr F W Best of ICI Europa and Mr H P Friedel of the BG Chemie in Heidelberg for help with information on the German cases 13-17. Dr Friedel has suggested that I should delete the existing case 14 and move 15, 16 and 17 up one in the numbering system. At the risk of causing confusion between the German case numbers and the numbers given in this register, I will adhere to my present system of not re-using a case number where the case has subsequently been shown not to be an ASL ie there will be a blank number where a case is subsequently dropped.

Interesting details of German Cases 13, 15, 16 and 17 and sparse information on Case 9 are given in the Annual Report of the North Rhine Westphalia Medical Inspectorate for 1978 pages 347-377.
- 4 I am grateful to Rose Kaminski of NIOSH for her letters of 19th June and 5th November 1980 with updates of her NIOSH register with notification of new cases US 29 and Yugoslavia 4 and removal of US 25 which could not be confirmed. NIOSH have however decided to keep US 24 on the register "even though it was diagnosed as Cholangiosarcoma, this neoplasm may also be associated with VCM".
- 5 In October 1980 I was told by Dr M N Johnson that the B F Goodrich case US 17 had died recently. This man was diagnosed as having ASL in 1974 and has lived for 6 years after diagnosis.
- 6 My questions regarding the clusters of ASL deaths stimulated replies from Dr Mayo Smith and Dr John Barr of Air Products who wonder whether the clustering is connected with particular plant design/ventilation combined with specific work practices which have led in the past to high exposures over extended periods. Re chronology they point to major expansions in the US in the late 40's and late 50's when new cohorts were exposed. There is a lot of data yet to be collated and analysed to explain what has happened here. Dr R Spirtas formerly of NIOSH and now NCI/NIH Bethesda in his letter of 30/5/79 advocated the need to continue the documentation of work histories as completely as possible. I agree with Dr Spirtas.

BUT

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WHAT HAS HAPPENED TO THE ANNUAL RATE OF ASL DEATHS ATTRIBUTABLE TO VCM?

The sample is too small to allow us to be dogmatic or even to speculate at this stage. However may I draw your attention to Table 1. Have ASL deaths peaked at 10 pa 1975-1978 and dropped to 4 pa in 1979 and 1980? Or has case reporting slowed up now that VCM is out of the media headlines?

It is interesting to look at new Tables 6 and 7 which I had prepared for the March 1980 Bethesda seminar before my offer of a paper was declined by NIOSH/OSHA. I have since used these data in a talk to trade union officers in the UK. There are many interesting questions one can ask about clustering and chronology of deaths in different countries. Quite clearly with the benefit of hindsight, Maltoni's end 1972/early 1973 findings were not going to be confirmed in 1972/3 by human epidemiology in Europe but in Canada and the US there was a good chance that human epidemiology would be showing something.

If we have all data for 1979/80, what a bizarre decline in annual rate and change in clustering viz In 1979, 2 in France and 2 in UK! In 1980, 2 in UK and 2 in US! The UK has had 6 ASL cases 1972, 1974 and now 2 in 1979 and 2 in 1980! The French and German annual clusterings in earlier years are also noteworthy.

I would be grateful to you for re-assurance about the accuracy and completeness of the 1979 and 1980 data

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In 1977, for a discussion of European producers, I prepared numerous tables giving data plant by plant in different regions of the World. The data included ASL cases, startup year of plant, capacity at startup, year of first exposure of ASL cases, capacity at first exposure and capacity as of 1977. I have given simplified versions as Tables 8-12 which miss out capacity data. There are some interesting features to be discerned in the different patterns of incidence of ASL eg in Western Europe compared with USA and Canada. One is tempted to rearrange these arrays of data to examine various hypotheses but draws back when one remembers the vast range of latency periods from 9 to 38 years.

John Stafford
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ICI Plastics Division
Bessemer Road
Welwyn Garden City
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JS/MM/19 February 1981

SL 107004

IMPERIAL CHEMICAL INDUSTRIES LIMITED
PLASTICS DIVISION

LIVER ANGIOSARCOMA CASES (REVIEW DATA - 1 MAY 1980)

Table Sequence

Belgium	1	ASL Case Numbers by year of Death (Table 6)	29
Canada	2-3		
Czechoslovakia	4	ASL Case Numbers by year of first exposure (Table 7)	30
France	5-7	Western Europe PVC Producers - Start-up Dates vs ASL Cases (Table 8)	31
Germany	8-11		
Italy	12	USA PVC Producers - Start-up Dates vs ASL Cases (Table 9)	32
Japan	13	Canadian PVC Producers - Start-up Dates vs ASL Cases (Table 10)	33
Norway	14		
Sweden	15	East European PVC Producers - Start-up Dates vs ASL Cases (Table 11)	34
UK	16-17	Japanese PVC Producers - Start-up Dates vs ASL Cases (Table 12)	35
USA	18-22		
Yugoslavia	23		
Incidence of Cases pa (Table 1)	24		
Distribution of Cases by Country (Table 2)	25		
Pattern of Cases by Factory (Table 3)	26		
Latency Periods (Table 4)	27		
Annual Geographical Incidence (Table 5)	28		

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LIVER Angiosarcoma Cases - (Review Date: 6 February 1981)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COUNTRY AND REFERENCE NO	NAME OR INITIALS	DATE OF BIRTH	COMPANY	FACTORY	FIRST VC EXPOSURE	DATE OF DIAGNOSIS	AGE AT DIAGNOSIS	YEARS OF EXPOSURE TO DIAGNOSIS	YEARS OF EXPOSURE	DATE OF DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS
<u>BELGIUM</u>															
01		12.01.13	Solvay	Jemeppe	00.07.58	00.05.76	63	18	17	29.06.76	Yes	High 1958-1968 exposed to 200 ppm for 8 hrs per day and certainly under 500 ppm in 6 to 9m ³ autoclaves 1968-1972 exposed to 50-200 ppm 8 hrs per day in 25m ³ autoclaves 1972-1974 exposed to 50-200 ppm in auto- clave room 1974-100 ppm 1975- 50 ppm RETIRED 1 Feb 1975	Autocleaner 14 yrs Polyworker 3 yrs Work in glass ind. & chemi- cal industry	Driller in a foundry (2 yrs) Farmer (15 yrs) Work in glass ind. & chemi- cal industry	Hepatic tests in Oct 1974 were normal. Retired Feb 1975 Hospitalised May 1976 Complete Clinical and career details are given in a paper by Hublet et al in Arch. Belg. Med. Soc., Hyg. Med., Trav. Med. Leg. 1977 pages 601-622

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LIVER Angiosarcoma Cases - (Review Date: 6 February 1981)

* All dates use UK system

DAY - MONTH - YEAR

** Data published in Journal of
Occ Med 1978 pages 338-340

*** Many of dates altered to fit NIOSH 31/3/77 list

Canada
Sheet 1

Page 2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COUNTRY AND REFERENCE NO	NAME OR INITIALS	DATE OF BIRTH	COMPANY	FACTORY	FIRST VC EXPOSURE	DATE OF DIAGNOSIS	AGE AT DIAGNOSIS	YEARS OF EXPOSURE TO DIAGNOSIS	YEARS OF EXPOSURE	DATE OF DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS
CANADA			SHAWINIGAN												
01		15.12.13			1944	1955	41	11	11	02.09.55	Yes		Reactor cleaner	Operator polymerisation	Smoker
02		06.03.14			1943	1957	43	14	14	21.12.57	Yes		Maintenance, millwright, pipefitter	Operator	Worked overtime Smoker
03		26.08.19			1941	1962	42	21	20	23.03.62	Yes		Operator, foreman		Worked overtime Non-smoker
04		05.04.19			1945	1967	48	22	22	21.01.68	Yes		Reactor cleaner	Operator, foreman, water cooling unit	Worked overtime Smoker
05		07.05.11			1944	1968	57	24	05	05.07.68	Yes		Reactor cleaner	Water cooling unit	Worked overtime Smoker
06		15.12.19			1947	1971	51	24	23	10.04.71	Yes		Reactor cleaner	Maintenance, millwright	Worked overtime Smoker
07		09.11.19			1946	1972	53	26	25	24.12.72	Yes		Reactor cleaner	Machine shop operator and poly unit	Worked overtime Smoker
08		13.05.20			1961	1973	53	12	05	12.06.73	Yes		Reactor cleaner	Maintenance machine shop	In plant 25 yrs! Smoker
09		19.07.21			1946	1974	53	28	26	04.09.74	Yes		Furnace op. pipefitter maintenance		Worked overtime Smoker

* Paper by Dr F DELORNE in Annales d'Anatomie pathologique Paris, 1978 Vol 23 No 2 pp105-114 claims this case had both a hepatoma and ASL simultaneously.

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LIVER Angiosarcoma Cases - (Review Date: 6 February 1981)

DAY - MONTH - YEAR

* All dates use UK system

** Data published in Journal of

Occ Med 1976 pages 338-340

*** Many of dates altered to fit NIOSH 31/3/77 list

Sheet 2
Canada

Page 3

[illegible]

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Page 4

LIVER Angiosarcoma Cases - (Review Date: 6 February 1981)

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LIVER Angiosarcoma Cases - (Review Date: 1 February 1981)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COUNTRY AND REFERENCE NO	NAME OR INITIALS	DATE OF BIRTH	COMPANY	FACTORY	FIRST VC EXPOSURE	DATE OF DIAGNOSIS	AGE AT DIAGNOSIS	YEARS OF EXPOSURE TO DIAGNOSIS	YEARS OF EXPOSURE	DATE OF DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS
FRANCE															
01	M	15.04.24	RP	Bouss- illon	00.01.44	18.02.67	43	21	19	19.02.67	Yes	High	Autoclave worker and cleaner 19 yrs		Ref. Ravier at al Arch. Mal. Prof. 1 30 n° 13 Nov 75 p 171-177
02	SIM	03.06.11	PCUK	Brignoud	06.07.59	15.01.75	63	16	12	24.01.75	Yes (NIOSH no comment)	High	2 yrs on monomer 10 yrs on polymer- ization	Italian origin	Ref. G Roaneton at al "Nouvelle Presse Medicale" 15 Nov 1977 p 735
03	NAV	06.01.20	RP	St Fons	00.00.44	15.01.75	55	29	29	29.06.75	Yes	High	Polyworker 10 yrs as autoclave cleaner Compounding 3 yrs	VCM production 16 yrs Italian POW Shepherd, Sawyer, Mason	Ref. Rety at al Arch. Mal. Prof. 1 37 n° 16 June 77 p 551-555
04	MOR	27.01.27	PCUK	Brignoud	19.10.49	16.01.76	49	26	26	04.01.76	Yes	High	Monomer production worker 18 yrs PVC Filtration 18 yrs		
05	B	29.01.38	PCUK	Brignoud	18.01.65	13.05.76	38	11	11	13.05.76	Yes	High	Polyworker 11 yrs	(1) Thoracotomy 19th Feb 1976 costal angiosarcoma (2) Scintigraphy found ASL (3) Haemorrhage from ASL (4) Right Hepatectomy	Ref. P Couderc et al "Semaine des Hospitaux" 10 Septembre 1976 Previously had bone angiosarcoma Also Pilichowski et al "La Nouvelle Presse Medicale" 17th July 1979 Page 2485

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France
Sheet 2

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LIVER Angiosarcoma Cases - (Review Date: 1 February 1981)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COUNTRY AND REFERENCE NO	NAME OR INITIALS	DATE OF BIRTH	COMPANY	FACTORY	FIRST VC EXPOSURE	DATE OF DIAGNOSIS	AGE AT DIAGNOSIS	YEARS OF EXPOSURE TO DIAGNOSIS	YEARS OF EXPOSURE	DATE OF DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS
FRANCE															
06	Pa	14.04.34	PCUK	Brignoud	01.03.58	12.08.76	42	10	13	11.09.76 (NIOBH says 12.09.76)	Yes	Moderate	(1958-1960) 2 yrs filtration 10-11 yrs polymer and works lab?		This man had AOL prior to AS. Ann. de Med. Prof. July '77 p 645 & 6. AOL was found in 1971 five yrs before ASL.
07	GIR	26.04.27	RP	St Auban	01.07.50	After death NIOBH says 00.07.76	49	26	22	02.07.76	Yes (NIOBH no comment)	High	Plant fore- man in polymer- isation	1972-6 admin section in St Auban	Died of septicaemia 'Small liver' lesion found after autopsy
08	B	01.04.34	Solvay	Daveux	23.05.57	03.12.75	42	19	19	30.01.77	Yes	Moderate	6 yrs packer & autoclave clnr 14 yrs autoclave worker		Had been tunnel worker previously
09	RFX	08.10.14	RP	St Fons	10.01.48	26.04.76	62	28	28	16.12.77	Yes	High	Polymer- isation operator, autocleaner, autoclave maintenance	10 yrs in sulphuric acid factory, storekeeper & general services	Operated 4.76 for removal of tumour from liver and died after second surgical operation for bilio bronchial fistula

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PLASTICS DIVISIONFrance
Sheet 3

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LIVER Angiosarcoma Cases - (Review Date: 1 February 1981)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COUNTRY AND REFERENCE NO	NAME OR INITIALS	DATE OF BIRTH	COMPANY	FACTORY	FIRST VC EXPOSURE	DATE OF DIAGNOSIS	AGE AT DIAGNOSIS	YEARS OF EXPOSURE TO DIAGNOSIS	YEARS OF EXPOSURE	DATE OF DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS
<u>France</u>															
10	VP	24.05.19	RP	St Fons	00.12.56	10.01.78	58	21	21	10.01.78	Yes	High	Autoclave cleaner	10 yrs in mechanical engineering industry 1946-1956	Died of pulmonary embolism 5 days after surgery
11	L	15.02.12	RP	St Fons	00.01.41	12.08.78	66	37	31	13.11.78	Yes	High	1941-1946 (polymer- isation general purpose worker 1946-1972 VCM synthesis (HCl & Acetylene) Foreman (agent de maintenance) 1972 retired		
12		16.06.14	PCUK	Brignoud	09.02.49	00.05.79	65	30	27	23.06.79	Yes	High	Monomer production and polymer- isation operator		
13		19.01.31	Solvay	Taveux	23.09.63	26.06.79	40	16	13	22.08.79			Autocleaner 12 yrs, Auto- operator 9 yrs, Copolymers 14 yrs	12 yrs as cycle mechanic. 10 yrs as operator in sanitary ware manufacture	Cigarette smoker until 1974. Ill all of 1977 due to oesophageal varices. Surgical intervention 25.05.79 (right hepatectomy)

LIVER Angiosarcoma Cases - (Review Date: 6 February 1981)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COUNTRY AND REFERENCE NO	NAME OR INITIALS	DATE OF BIRTH	COMPANY	FACTORY	FIRST VC EXPOSURE	DATE OF DIAGNOSIS	AGE AT DIAGNOSIS	YEARS OF EXPOSURE TO DIAGNOSIS	YEARS OF EXPOSURE	DATE OF DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS
GERMANY															
01		00.00.30	Dynamit	Troisdorf	01.10.56	19.09.68	38	12	12	25.01.69	Yes (NIOBH)		Polyworker		
02		00.00.31	Dynamit	Troisdorf	14.10.57	25.09.70	39	13	11	14.12.71	Yes (NIOBH)		Polyworker		
03		00.00.30	Dynamit	Walsfelden	09.06.52	00.03.73	43	21	16	10.10.73	Yes (NIOBH)		Filling pesticide aerosol cans with VC		Reported under non polymer- isation workers in NIOBH list of 31.3.77. This of course is strictly correct. However I wonder whether this man had high exposure to VC in his can filling operation?
04		00.00.30	Wecker	Burg- hausen	16.04.57	26.11.74	44	17	17	25.11.74	Yes (NIOBH)	200-500 ppm but high during 1 yr autocleaner	Polyworker & temporary autocleaner for 1 yr	1958 was autocleaner	Clinical details in paper by Gokel et al Virchows Arch A Path 1976 372 p 195-203

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PLASTICS DIVISIONGermany
Sheet 2

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LIVER Angiosarcoma Cases - (Review Date: 6 February 1981)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COUNTRY AND REFERENCE NO	NAME OR INITIALS	DATE OF BIRTH	COMPANY	FACTORY	FIRST VC EXPOSURE	DATE OF DIAGNOSIS	AGE AT DIAGNOSIS	YEARS OF EXPOSURE TO DIAGNOSIS	YEARS OF EXPOSURE	DATE OF DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS
GERMANY 05 (NIOBH gives as Case 06)		00.00.36	Hoechst	Frankfurt	02.04.60	10.12.73	38	13	05	16.12.74	Yes (NIOBH)		BU Chemie says "chemistry laboratories in the Techno- logical Research Department" (NIOBH says assistant factory chemist which may be wrong translation)		Confirmed Reported under non-polymer- isation workers in NIOBH list of 31.3.77 and 1.78. I don't think this is a correct classification by NIOBH. The man may have been involved in VCM polymerisation in pilot plant or in main
06 (NIOBH gives as Case 05)		00.00.30	Lonza	Waldshut	16.12.62	00.00.75	43	13	12	10.01.75	Yes		PVC - Manu- facture Shift Leader		
07		00.00.26	Wacker	Berg- hausen	15.04.54	12.11.75	49	21	21 (NIOBH says 12)	13.11.75	Yes		PVC Manu- facture and all work incl auto- cleaning 12 yrs (1954-66) Foreman Tech Dev 8 yrs (1967-1975)		
08		00.00.17	Dynamit	Troisdorf	19.07.54	06.04.75	58	22	21	25.12.75	Yes	?	Polyworker	?	

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PLASTICS DIVISIONGermany
Sheet 3

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LIVER Angiosarcoma Cases - (Review Date: 6 February 1981)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COUNTRY AND REFERENCE NO	NAME OR INITIALS	DATE OF BIRTH	COMPANY	FACTORY	FIRST VC EXPOSURE	DATE OF DIAGNOSIS	AGE AT DIAGNOSIS	YEARS OF EXPOSURE TO DIAGNOSIS	YEARS OF EXPOSURE	DATE OF DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS
GERMANY															
09		00.00.34	CWI	Merl	20.02.61	16.06.76	41	15	13	24.03.78	Yes	High peaks	12 yrs poly- worker incl 17% auto- clave cleaning Control room 1 yr		10/78 Confirmed Average exposure first 9 yrs 150 ppm. occ 1000 ppm. Next 3 yrs av. 75 ppm. Last. 1 yr av 35 ppm
10 (NIOSH gives as Case 11)		00.00.36	CWI	Merl	01.01.61	00.01.77	40	16	10	07.03.77	Yes	High peaks	10 yrs poly- worker incl 17% auto- clave cleaning		Average exposure first 9 yrs 150 ppm. occ 1000 ppm. Last yr av 75 ppm. CWI letter of 21.04.78
11 (NIOSH gives as Case 10)		00.07.29	Wacker	Burg- hausen	10.10.55	28.06.77	47	22	22	28.06.77	Yes	High	3 yrs auto- clave cleaner 19 yrs filter operator		
12		00.00.38	Dynamit	Triedorf	00.00.61	00.10.77	39	16	6	07.10.77	Yes	1	PVC Manu- facture Autoclave worker for 6 yrs		

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IMPERIAL CHEMICAL INDUSTRIES LIMITED
PLASTICS DIVISIONGermany
Sheet 4

Page 11

LIVER Angiosarcoma Cases - (Review Date: 6 February 1981)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COUNTRY AND REFERENCE NO	NAME OR INITIALS	DATE OF BIRTH	COMPANY	FACTORY	FIRST VC EXPOSURE	DATE OF DIAGNOSIS	AGE AT DIAGNOSIS	YEARS OF EXPOSURE TO DIAGNOSIS	YEARS OF EXPOSURE	DATE OF DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS
GERMANY															
13		00.00.14	Lonza	Waldshut	00.00.60	08.04.78	64	18	14	19.06.78	Yes				[F W Best letter of 30th June enclosing data from Mr H F Friedel of BG Chemie]
14											Not an Angiosarcoma				[F W Best letter of 30th June enclosing data from Mr F Friedel of BG Chemie withdrawing this case]
15	(NIOSH gives this as Case 13)	00.00.29	Hacker	Berghausen	19.10.53	09.10.78	49	25	25	23.10.78	Yes	?	Autoclave cleaner and worker. Drier operator. Later shift leader		[Angiosarcoma confirmed 09/79. Some detail of this & also cases 19, 13, 15, 16 & 17 given in NRW Report for 1978]
16		00.00.23	Dynasit	Troisdorf	10.01.53	07.08.78	55	23	20	07.08.78	Yes ASL and Nepotocellular Carcinoma	High	Autoclave worker till 1964. Leader and master		[Angiosarcoma confirmed, full details of illness since March 1973 given in NRW Med Insp Rep for 1978.]
17	(NIOSH gives as Case 15)	00.00.37	Dynasit	Troisdorf	01.11.61	14.08.78	41	16	11	28.08.78	Yes	High	Autoclave worker	No	[Angiosarcoma confirmed. Annual report of the North Rhine Westphalia Medical Inspectorate for 1978 pages 347-377 gives full details. Vinyl chloride disease diagnosed 02-02-73. Oesophageal varices. probably acro osteolysis.]

* At the NIOSH/OSHA/NIHHS Symposium in Bethesda 20/21 March 1980 Dr Weber said there were now 17 confirmed cases in Germany. I therefore presumed cases 13 and 14 were now histologically confirmed. On 30th June 1980 I received from Dr F W Best of ICI Europa data originating from Mr H F Friedel of BG Chemie who stated that case 13 was a confirmed ASL and case 14 was not an ASL. Case 14 is

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* Should this case be removed from the list? NIOSH have it on their supplementary list relating to

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JS 1/6/77

[illegible]

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COUNTRY AND REFERENCE NO	NAME OR INITIALS	DATE OF BIRTH	COMPANY	FACTORY	FIRST VC EXPOSURE	DATE OF DIAGNOSIS	AGE AT DIAGNOSIS	YEARS OF EXPOSURE TO DIAGNOSIS	YEARS OF EXPOSURE	DATE OF DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS
<u>JAPAN</u>															
01	Tomoji Mori	01.08.22	Mitsui Toatsu (no comment by Jap PVC Assoc)	Nagoya	00.04.53	24.10.75	53	22	13	24.10.75	Yes	PVC Assoc (says not known. * Japan Times indicated on 25.10.75 exposures often at 3000 ppm up to 1974)	13 yrs auto- clave cleaner 1964 - (assigned to different work since had ill health)		Japan Times (25.10.75 & Japanese PVC Assoc letter of 31.03.78)
02	SO	02.08.39			00.11.58	10.08.76	37	17	13	10.08.76	Yes	Not known	In polymer- isation work (including autoclave cleaning)		Japanese PVC Association letter of 31.03.78

CASES NOT YET CONFIRMED

	Shizuo Sato		Sub- contractor to Mitsui Toatsu	Nagoya								Reactor cleaner 1964-1974			Pre-cancerous (disorder of liver Japan Times (25.10.75 not confirmed by Jap PVC Assoc
	Shigeo Tanaka		Mitsui Toatsu	Nagoya	1953	Nov 1968	43	16		14.01.69					Japan Times (27.10.75 (some figures uncertain had print). Not (confirmed by Jap PVC Assoc
	Kazuyoshi Ono		Mitsui Toatsu	Nagoya		Dec 1967	47			Dec 1967					Japan Times (27.10.75. Not (confirmed by Jap PVC Assoc

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COUNTRY AND REFERENCE NO	NAME OR INITIALS	DATE OF BIRTH	COMPANY	FACTORY	FIRST VC EXPOSURE	DATE OF DIAGNOSIS	AGE AT DIAGNOSIS	YEARS OF EXPOSURE TO DIAGNOSIS	YEARS OF EXPOSURE	DATE OF DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS
<u>NORWAY</u>															
01	AM	23.12.15	Morsk Hydro	Harøya	00.03.50	21.12.71	36	22	21	04.01.72	Yes	High	Foreman & Autoclave supervisor		Confirmed by Dr Thilo- Evanson of NH. At APHE Mtg of 19 June 1978 Mr P Baagnes stated that AM had been a member of a start-up team VCM & PWC were made in same building. The VCM was made from acetylene

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COUNTRY AND REFERENCE NO	NAME OR INITIALS	DATE OF BIRTH	COMPANY	FACTORY	FIRST VC EXPOSURE	DATE OF DIAGNOSIS	AGE AT DIAGNOSIS	YEARS OF EXPOSURE TO DIAGNOSIS	YEARS OF EXPOSURE	DATE OF DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS
<u>SWEDEN</u>															
01	NU	23.06.27	Kemanord	Sundsvall	14.08.51	20.10.70	43	19	18	20.10.70	Yes		Polyworker		
02	BL	27.11.11	Kemanord	Sundsvall	00.01.45	00.08.72	61	27	27	16.08.72	Yes	High	VCM production		Mr Sjoelin's letter of 28 March 1978 confirms BL was a monomer worker who was heavily exposed, probably even more so than a normal reactor cleaner
03	NE	10.06.10	Kemanord	Sundsvall	00.05.47	18.03.76	65	29	21	19.03.76	Yes	High	Polyworker		
04	AL	16.11.14	Kemanord	Sundsvall	00.00.46	12.05.77	62	31	31	12.05.77	Yes	High	1946-1958 polymer- isation worker (12 yrs) & 1958- 1977 foreman (19 yrs)		In first 12 yrs of employment had been heavily exposed. In 1974, liver abnormality and necrosis diagnosed. Data confirmed in Dr D Hyren letter 18.8.77 to CEPIC

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COUNTRY AND REFERENCE NO	NAME OR INITIALS	DATE OF BIRTH	COMPANY	FACTORY	FIRST VC EXPOSURE	DATE OF DIAGNOSIS	AGE AT DIAGNOSIS	YEARS OF EXPOSURE TO DIAGNOSIS	YEARS OF EXPOSURE	DATE OF DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS
UK 01	WJ	20.04.01	ICI	Millhouse	04.04.44	03.12.72 (Fox & Collier paper says 23.12.72)	71	20	22	03.12.72 (Fox & Collier paper says 23.12.72)	Yes	500 ppm	1944-7 VCM 1947-8 Drier 1948-61 Autoclave operator 1961-66 Drier		
03	BJW	02.06.37	BP	Berry	00.02.66	00.12.74	37	09	3.5	24.12.74	Yes	High	Autoclave cleaner		Exposure limited to 2.66 - 9.69
04	JSR	23.06.20	ICI	Millhouse	26.04.54	00.06.79	59	25	10	12.10.79	Yes	Medium- high	54-55 Bagging Plant 55-56 Drier Plant 56-58 Autoclave worker 58-61 Chargehand Drier Plant 61-72 Foreman C 2/3 Plant	Pre-war fish packer 1939-45 army vehicle maintenance 1945-54 fish packer	

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COUNTRY AND REFERENCE NO	NAME OR INITIALS	DATE OF BIRTH	COMPANY	FACTORY	FIRST VC EXPOSURE	DATE OF DIAGNOSIS	AGE AT DIAGNOSIS	YEARS OF EXPOSURE TO DIAGNOSIS	YEARS OF EXPOSURE	DATE OF DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS
UK 05	JK	30.03.14	BP	Berry	08.01.51	00.10.79	45	28	21	19.11.79			1951-52 (Polycleaner) 1952-55 (Latex) 1955-60 (Polyfloor) 1960-64 (Poly (Chargeband 1964-70 (Charging operator 1970-72 (Drier operator		
06	GRP	1931	BP	Berry	1962	09.01.80	48/9	18	12	09.01.80			(Greaser on Poly Floor		
07	RB	1920	BP	Berry	1963		60	17		13.06.80			(Polycleaner 1963-5 (Recovery 1965-1971		
															In their supplementary list HIOSE are still quoting Case 02 from IOCO which has been discounted in the UK. IOCO spread many polymers including PVC onto fabrics. The UK Government Medical Advisory Service also know of two further con- firmed ASL cases in plastics fabrication workers but it is dubious whether they ever handled

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COUNTRY AND REFERENCE NO	NAME OR INITIALS	DATE OF BIRTH	COMPANY	FACTORY	FIRST VC EXPOSURE	DATE OF DIAGNOSIS	AGE AT DIAGNOSIS	YEARS OF EXPOSURE TO DIAGNOSIS	YEARS OF EXPOSURE	DATE OF DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS
USA															
01	Earl Parks	17.10.23	BFG	Louis- ville	09.12.48	03.03.73	49	24	21	03.03.73	Yes		Pot Cleaner (Block Jena 1974) p 53	History given in Annals NY ACAD SCIENCES Vol 329 (1979) page 190 in Paper by B R Cottine of OSHA	Rolling Stone Art Ref 1 NY Acad of Sc Symp (1974) Also Block Jena 1.7.74 p 53
02		19.08.33	BFG	Louis- ville	15.11.55	00.05.70	37	14	13	27.09.71 (NIOSH says 28.09.71)	Yes		Pot Cleaner (Cf Block)		Ref 1 Also Block JANA 1.7.74 p 53
03	Edward Dunwiddie	25.05.15	BFG	Louis- ville	28.11.45	19.12.73	58	28	28	19.12.73	Yes		Pot Cleaner (Cf Block)	Louisville Courier Journal 02-09-80	Ref 1 Also Block
04		15.01.24	BFG	Louis- ville	06.07.52	19.08.67	43	15	15	07.01.68	Yes		Pot Cleaner (Cf Block)		Ref 1 Also Block
05		25.01.12	BFG	Louis- ville	19.04.44	09.04.64	52	20	20	09.04.64	Yes		Pot Cleaner (Cf Block)		Ref 1 Also Block
06	Ray Austin Jones?	23.11.28	BFG	Louis- ville	17.01.62	00.02.74	45	12	12	24.07.75	Yes		US Air Force Pot Cleaner (Cf Block)		Ref 1 + Louisville Times 23.7.75 Retired April 1974 Also Block
07	Charles T Smart	03.05.22	UCC	S Charle- ston	27.08.44	00.00.68	45	24	17	23.03.68	Yes				Ref 1
08		06.05.20	Goodyear	Niagara	07.10.46	00.08.61	41	15	15	29.08.61	Yes				Ref 1

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COUNTRY AND REFERENCE NO	NAME OR INITIALS	DATE OF BIRTH	COMPANY	FACTORY	FIRST VC EXPOSURE	DATE OF DIAGNOSIS	AGE AT DIAGNOSIS	YEARS OF EXPOSURE TO DIAGNOSIS	YEARS OF EXPOSURE	DATE OF DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS
USA															
09	Raymond (Cottle- Finger?)	08.11.31	BPC	Louis- ville	28.05.45	01.03.74	43	29	24	11.03.75	Yes	2000 ppm			Ref 1 has wrong figures for first exposure. (Louisville Times 29.10.74, 12.3.75, 10.3.76
10		16.08.13	Goodyear	Wigara	12.06.51	00.05.68	55	17	17	10.05.68	Yes				Ref 1
11		27.05.09	Goodyear	Wigara	14.10.46	00.03.70	61	23	23	16.03.70	Yes				Ref 1
12	Francis A Rehman	17.11.18	Firestone	Pottstown Pa	13.07.49	02.05.69	50	20	19	02.05.69	Yes	High 10 yrs	10 yrs as reactor op. (not cleaner - separate crew cleaned autoclaves)	Utility & Service op. Bagger Dryer op. Stripping op. 3 yrs prior service in tyre plant	Ref 1 + letter (of 26 April 1978 from Russell A Park to J T Seawell of MCA
13	Richard Edward Clendenin	01.12.21	UCC	8 Charle- ston	11.12.42	00.05.74	52	32	24	07.04.74	Yes	2000 ppm			Charleston Daily Mail 21.7.75
14															Dubious fabrication case
15															Dubious fabrication case

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COUNTRY AND REFERENCE NO	NAME OR INITIALS	DATE OF BIRTH	COMPANY	FACTORY	FIRST VC EXPOSURE	DATE OF DIAGNOSIS	AGE AT DIAGNOSIS	YEARS OF EXPOSURE TO DIAGNOSIS	YEARS OF EXPOSURE	DATE OF DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS
USA															
16	James Howard	04.11.27	BFG	Louis- ville?	08.05.50	00.00.69	41	19	04	27.03.69	Yes		1951-4 VCM (polymer- isation	From 1954 onwards in Army and other service. 46-50 Army	Table 4 in Wagoner Testimony to US Senate Confirmed in N M Johnson ltr 07.08.78
17		06.05.31	BFG	Louis- ville?	23.06.55	11.10.74	43	19	19	October 1980?	Yes				Dr N M Johnson told me in October 1980 this case had died recently, 6 years after diagnosis
18	Charlie Arthur	22.04.28	BFG	Avon Lake	15.09.54	00.00.75	46	21	13	02.11.75	Yes	13 yrs (autocleaner; 8 yrs on Etol plasticiser; 5 Carboest operation	Navy Tyre Store	Confirmed in N M Johnson ltr 07.08.78 Also Rolling Stone mag. 15.01.76	
19	Virgil Christian	00.00.15	BCC	8 Charle- ston	00.00.43	19.06.75	60	32	32	06.04.76	Yes	2000 ppm			Williamsport Sun Gazette 21 June 1975 Charleston Daily Mail 21.7.75
20		31.08.17	Goodyear	Wagare	00.00.55	30.01.76	58	21	18	30.01.76	Yes				NIOSH letter of 25.10.79
21	Chester Winkle	02.09.09	UCC	8 Charle- ston	00.12.46	Early 77	67	30	22	02.01.77	Yes				28 yrs with UCC at SC Retired News release 23.2.77

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COUNTRY AND REFERENCE NO	NAME OR INITIALS	DATE OF BIRTH	COMPANY	FACTORY	FIRST VC EXPOSURE	DATE OF DIAGNOSIS	AGE AT DIAGNOSIS	YEARS OF EXPOSURE TO DIAGNOSIS	YEARS OF EXPOSURE	DATE OF DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS
USA															
22		02.10.23	Is this BFG?	Is this 10th Louis- ville victim?	11.07.47	00.01.76	52	29	28	04.12.76	Yes				Louisville Times 26.1.76 said he was the 10th AS victim at Belle Lane of whom 8 had died by 26.1.76
23		00.00.23	Grant American Chemical Company	Pittsburg Mass.	08.09.58	06.04.73	50	15	14	06.04.73	Yes				
24	Charles Edward Moore	17.05.17	UCC	8 Charle- ston	1939	27.05.77	60	38	24† (NIOBH says 26)	27.05.77	Cholangio- sarcoma (R Kaminski 26/2/79)	Medium to high for 24 yrs	1941-65 non- solvent labourer vinyl resin unit and dispersion vinyl resins unit first as fitter cleaner helper, then shift utility man	1937-39 was off and on labourer 1939-41 may have been exposed as reactor cleaner 1943 became shift fitter 1946 became shift utility man 26.04.65 employment was terminated	M H Wheeler letter of 18.8.77 to J Stafford gives details Rose Kaminski letter of 26/2/79 R Kaminski (5 Nov 1980) suggests that NIOBH will retain on register since this neoplasm may be associ- ated with ASL.
(25)															R H Wheeler letter of 20/2/79 and Rose Kaminski letters of 26/2/79 and 5/11/80
															Removal from register confirmed in R Kaminski letter of 5 November 1980

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*UK system of dates
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COUNTRY AND REFERENCE NO	NAME OR INITIALS	DATE OF BIRTH	COMPANY	FACTORY	FIRST VC EXPOSURE	DATE OF DIAGNOSIS	AGE AT DIAGNOSIS	YEARS OF EXPOSURE TO DIAGNOSIS	YEARS OF EXPOSURE	DATE OF DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS
USA 26	John Berry	07.07.23	BFG	Louis- ville	03.10.47	00.00.77 (up to 2 years after death)	52 (death)	28 (death)	18	11.02.75	Yes	Exposed in some degree to 22 chemicals but main exposure was to VCM, probably high	Various jobs in PVC plants from cold room to paste recovery to PVC charging operator to paste charging. 111 August 1963. Terminated employment Jan 1966		R Kaminski letter of 26/2/79 and Prof. Tamburro letter of 9/1/79
27	J L Forrest	11.03.16	UCC	8 Charle- ston	01.07.41	30.11.78	62	37	20 (WLOSH says 27 and C Daily Mail (25))	25.11.78	Yes	High	Operator to 10.10.76	Exposure in bulk and dispersion PVC manufacture	R N Wheeler letter of 4 Jan 1979 and Charleston Daily Mail 30.11.78 and R Kaminski 26/2/79
28		11.04.17	UCC	8 Charle- ston	00.08.44	03.11.78	61	34	33	03.11.78	Yes				R Kaminski letter of 6/4/79
29		12.10.07	UCC	8 Charle- ston	00.05.42	00.03.80	72	36	16	01.03.80	Yes				R Kaminski letters of 19th June 1980 & 5th Nov 1980
30	WVN	22.7.22	Tenneco	Flem- ington	11.6.64	(30.12.80) 12.2.81	58	16.5	6+? 9 Minimal	3.12.80	Yes	6 years - Unknown but varied low to high	6 years - Maintenance Mechanic		

1 1/2 years - 1 1/2 years - worked elsewhere
Unknown
9 years - 9 years - Boilerhouse operator
Very low
in non-
regulated
Area

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COUNTRY AND REFERENCE NO	NAME OR INITIALS	DATE OF BIRTH	COMPANY	FACTORY	FIRST VC EXPOSURE	DATE OF DIAGNOSIS	AGE AT DIAGNOSIS	YEARS OF EXPOSURE TO DIAGNOSIS	YEARS OF EXPOSURE	DATE OF DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS
<u>YUGOSLAVIA</u>															
01		05.04.14	Jugo Vinil	Split	00.00.53	08.04.73	59	20	20	08.04.73	Yes				SARIC at al paper Env Health Perspective Vol 17, pp 189-192 1976
02		15.11.31	Jugo Vinil	Split	00.00.50	12.07.73	42	23	18	12.07.73	Yes*		VCH Production		*In his letter of 3 Oct 1978, Dr Spirtas of NIOSH changed the status of Case 02 to VCH production employee. Dr Spirtas also notified a new Case 03 also a VCH production worker
03		21.12.31	Jugo Vinil	Split	04.06.54	11.01.76	45	22	22	11.01.76	Yes*		VCH Production		
04		11.06.30			15.12.58	03.09.78	48	20	18	03.09.78	Yes				Rose Kaminski Letter of 19th June 1980

Incidence of ASL Cases Per Annum

	<u>By date of death</u>
1955	1
6	0
7	1
8	0
9	0
1960	0
1	1
2	1
3	0
4	1
5	0
6	1
7	1
8	5
9	3
1970	2
1	3
2	5
3	7
4	6
5	11
6	11
7	9
8	10
9	4
1980	15
Total	<u>87</u> 88

N.B. 1 Does not include Italian 01 but does include German 03.

2 Does not include Japanese suspect cases. Since post mortem examinations are rare events in Japan, confirmation of ASL is a problem as indeed is its discovery,

3 The 1977 total includes US case 24 which is a Cholangiosarcoma,

Distribution of ASL Cases by Country

USA	27 26 ***
Canada	10
W Germany	16 **
France	13
Sweden	4 ****
Yugoslavia	4 *****
Italy	2 *
UK	6
Czechoslovakia	2
Norway	1
Belgium	1
Japan	2
Total	<u>87</u> 88

* Omit It01 - atypical case of PVC bag extruder,

** Includes GEO3 aerosol can filler.

*** Includes case US 24 which was diagnosed as Cholangiosarcoma.

**** Includes one monomer worker.

***** Includes two monomer workers.

i.e. North America	36 37
Western Europe	43
Rest of World	8

Total 87 88

Pattern of ASL Cases by Factory(a) W Europe

Of the 43 cases in W Europe, 35 have occurred in clusters at 10 factories. Of the 16 German cases, 14 have occurred in clusters at 4 factories.

	<u>ASL Cases</u>
Kemanord, Sundsvall	4
PCUK, Brignoud	5
Dynamit, Troisdorf	6
RP, St Pons	4
Wacker, Burghausen	4
CWH, Marl	2
ICI, Hillhouse	2
BP, Barry	4
Solvay, Tavaux	2
Lonza, Waldshut	2
	<u>35</u>

(b) N America

Of the 36 cases in N America, 31 have occurred at four factories out of a total of 49 factories - in N America 43 plants have not had ASL cases,

	<u>ASL Cases</u>
BFG, Shawinigan	10
BFG, Louisville	11
UCC, S Charleston	8
Goodyear, Niagara	4
	<u>33</u>

(c) Rest of World

The 8 ASL cases are believed to be in 1 cluster of 4 and 2 clusters of 2 cases.

TABLE 4Latency Periods (Years from first Exposure to Diagnosis)

	<u>W Europe</u>	<u>No of Cases</u>	<u>Total Years</u>	<u>Average</u>
	Belgium	1	18	18
	France	13	298	22.9 *
	Germany	16	283	17.7 *
	Italy	2	37	18.5
	Norway	1	22	22
	Sweden	4	106	26.5
	UK	<u>6</u>	<u>125</u>	<u>20.8</u>
		<u>43</u>	<u>889</u>	<u>20.7</u>
<u>N America</u>				
	US	26	634	24.4 *
	Canada	<u>10</u>	<u>204</u>	<u>20.4</u> *
		<u>36</u>	<u>838</u>	<u>23.3</u>
<u>Rest of World</u>				
	Czechoslovakia	2	31	15.5
	Japan	2	39	19.5
	Yugoslavia	<u>4</u>	<u>85</u>	<u>21.2</u>
		<u>8</u>	<u>155</u>	<u>19.4</u>
<u>Summary</u>				
	W Europe	43	889	20.7
	N America	36	838	23.3
	Rest of World	<u>8</u>	<u>155</u>	<u>19.4</u>
		<u>87</u>	<u>1882</u>	<u>21.6</u>

* Of the countries with 10 cases, France and USA have average latency period above world average and Germany well below.

Annual Incidence of ASI Cases (Date of Death) by Geographical Area

	Western Europe	North America	Rest of World	Annual Total
1955		1		1
7		1		1
1961		1		1
2		1		1
4		1		1
6			1	1
7	1			1
8		5		5
9	1	2		3
1970	1	1		2
1	1	2		3
2	4	1		5
3	1	4	2	7
4	3	2	1	6
5	6	4	1	11
6	6	3	2	11
7	6	3		9
8	7	2	1	10
9	4			4
1980	2	2 3		4 5
	43*	36 37	8	87 88

* Includes G03 aerosol can filler but omits It 01 bag extruder

TABLE 6

ASL CASE NUMBERS BY YEAR OF DEATH AND GEOGRAPHICAL LOCATIONS (EXCLUDING ITO1)

		WESTERN EUROPE	NORTH AMERICA	REST OF WORLD
	1955		C1	
	6			
	7		C2	
	8			
	9			
	1960			
	1		US8	
	2		C3	
	3			
	4		US5	
	5			
	6			Cz2
	7	F1		
	8		C4, C5, US4, US7, US10	
	9	G1	US12, US16	
Viola	1970	Sw1	US11	
	1	G2	C6, US2	
	2	N1, Sw2, UK1, It2	C7	
Maltoni	3	G3**	C8, US1, US3, US23	Y1, Y2
Goodrich	4	G4, G5, UK3	C9, US13	Cz1
	5	F2, F3, G6, G7, G8, It3	US6, US9, US18, US26	Jap1
	6	B1, F4, F5, F6, F7, Sw3	US19, US20, US22,	Jap2, Y3
	7	F8, F9, G10, G11, G12, Sw4	C10, US21, US24*	
	8	F10, F11, G9, G13, G15	US27, US28	Y4
		G16, G17		
	9	F12, F13, UK4, UK5		
	1980	UK6, UK7	US17, US29	
	Total	43	36	8

* Cholangiosarcoma

** Aerosol Can Filler

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TABLE 7

ASL CASE NUMBERS BY YEAR OF FIRST EXPOSURE AND GEOGRAPHICAL LOCATION
(EXCLUDING ITO1)

		WESTERN EUROPE	NORTH AMERICA	REST OF WORLD
	1939		US24*	
	40			
	1	Fr11	C3,US27	
	2		US13, US29	
	3		C2,US19	
	4	UK1	C1,C5,US5,US7,US28	
	5	Sw2	C4,US3,US9	
	6	Fr1,Fr3,Sw4	C7,C9,US8,US11,US21	
	7	Sw3	C6,US22,US26	
	8	Fr9	US1	
	9	Fr12,Fr4	US12	
	50	Fr7,N1	US16	Y2
	1	Sw1,UK5	US10	Cz2
	2	G3**	US4	
	3	G15,It3	C10	Jap1,Y1
	4	G7,C8,UK4	US18	Y3
	5	G11,G16	US2,US17,US20	
	6	FR10,G1		
	7	Fr8,G4,It2,G2		Cz1
	8	Fr6,B1	US23	Jap2,Y4
	9	Fr2		
	60	G5,G13		
	1	G9,G10,G12,G17	C8	
	2	G6,UK6	US6	
	3	Fr13, UK7		
	4			
	5	Fr5		
	6	UK3		
	7			
	8			
	9			
Viola	70			
	1			
	2			
Maltoni	3			
Total	43		36	8

* Cholangiosarcoma

** Aerosol Can Filler

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TABLE 8

WESTERN EUROPE PVC PRODUCERS - START-UP DATES vs ASL CASES (OMITTING GO3)

START-UP YEAR	COUNTRY NAME	COMPANY NAME	LOCATION	ASL CASE NUMBER	YEAR OF 1st Exposure
1940	United Kingdom	ICI	Hillhouse	01,04	44,54
1941	France	Rhone-Poulenc	St Fons	03,09,10,11	46,48,56,41
1944	West Germany	BASF	Ludwigshafen		
	West Germany	Wacker	Burghausen	04,07,11,15	57,54,55,53
1945	Sweden	Kemanord	Sundsvall (Stockvik)	01,02,03,04	51,45,47,46
	Switzerland	Lonza	Lalden (Visp)		
1946	France	Rhone-Poulenc	Rousillon	01	46
1947	Italy	Montedison	Porto Marghera	02	57
1948	United Kingdom	BP Chem	Barry	03,05,06,07	66,51,62,63
	West Germany	Huls	Marl	09,10	61,61
1949	Belgium	Solvic	Jemeppe	01	58
1950	France	Puk	Brignoud	02,04,05,06,12	59,49,65,58,49
	France	Rhone-Poulenc	St Auban	07	50
	Holland	Shell	Pernis		
	Norway	Norsk	Heroya	01	50
1951	Italy	Montedison	Brindisi		
1952	Italy	Montedison	Terni		
1953	Austria	Halvic	Hallein		
	France	Solvic	Tavaux	08,13	57,63
	Italy	Solvic	Ferrara	03	53
	Spain	Rio Rodano	Hernani		
	United Kingdom	BIP	Aycliffe		
	West Germany	Hoechst	Gendorf		
1954	West Germany	Dynamit	Troisdorf	01,02,08,12,16,17	56,57,54,61,55,61
1955	Spain	Monsanto Iberia	Monzon		
1956	Spain	Caixa	Sabinanigo		
		Hispanic	Torrelavega		
1958	West Germany	Solvay	Rheinberg		
1960	Italy	S C Ravenna	Ravenna		
1962	Portugal	Cires	Oporto		
	West Germany	Lonza	Waldshut	06,13	62,60
1965	France	Rhone-Poulenc	Montlucon		
	Italy	Pozzi	Ferrandina		
	West Germany	Wacker	Cologne		
1966	West Germany	Hoechst	Knapsack (Frankfurt)	05*	60
1967	France	ATO Chimie	Balan		
	Spain	Rio Rodano	Miranda de Ebro		
	Greece	Esso Pappas	Diavata Salonika		
1968	Belgium	Badiphil	Antwerp		
1969	United Kingdom	Vinatex	Staveley		
	Italy	Rumianca	Cagliari Sardinia		
1970	Italy	SIR	Porto Torres Sar		
	United Kingdom	ICI	Runcorn		
1971	Italy	S C Ravenna	Ravenna		
	Spain	Hispanic	Martorell		
	Sweden	Kemanord	Stanungsund		
	United Kingdom	BP Chem	Baglan Bay		
1972	Finland	Pekema	Svartback		
	Holland	DSM	Beek Limburg		
1976	France	Soc Art D'vinyl	Mazingarbe		
1977	Spain	Monsanto Iberia	Tarragona		

* Laboratory worker in Research Department

TABLE 9

USA PVC PRODUCERS - START-UP DATES vs ASL CASES

START-UP YEAR	COMPANY NAME	LOCATION	ASL CASE NUMBER	YEAR OF 1st EXPOSURE
1939?	*UCC	S Charleston	07,13,19,21,24, 27, 28, 29	44, 42, 43, 46, 39, 41, 44, 42
1940?	*BFG	Louisville	01,02,03,04,05, 06,09,16,17,22, 26	48,55,45,52,44, 62,45,50,55,47, 47
1946?	*UCC	Texas City		
1947	Goodyear	Niagara Falls	08,10,11,20	46,51,46,55
1948	Firestone	Pottstown	12	49
	Uniroyal	Painesville		
1950	Monsanto	Springfield		
1952	Dow	Midland		
	BFG	Avon Lake	18	54
1953	Diamond	Deer Park		
1954	General Tire	Ashtabula		
1956	Air Products	Pensacola		
	Atlantic Refining	Brooklyn		
	Borden	Leominster		
	Conoco	Hebronville		
	BFG	Niagara		
	Great American Plastics	Fritchburg	23	58
	Hooker	Hicksville		
	Pantasote	Passaic		
1957	Atlantic Tubing	Cranston		
	Tenneco	Flemington NJ		
1958	Keysor Century	Saugus, Cal		
1960	BFG	Watson, Cal		
	Air Products	Calvert City		
	Borden	Illioopolis		
1962	Tenneco	Flemington NJ		
1963	Conoco	Aberdeen, Miss		
	Stauffer	Long Beach, Cal		
1965	Conoco	Assonet, Mass		
	Ethyl	Baton Rouge		
1966	Diamond	Delaware City		
	General Tire/Pantas	Mt Pleasant W Va		
	BFG	Henry, Ill		
	Stauffer	Delaware City		
1967	Allied	Painesville, O		
	Hooker	Burlington NJ		
1968	Firestone	Perryville		
1969	BFG	Pedrickton NJ		
	Goodyear	Plaquemine		
	Olin	Assonet, Mass		
1971	Conoco	Oklahoma City		
1972	Nat Starch	Meredosia, Ill		
1973	Borden	Springfield		
	Robintech	Painesville, O		
1974	Atlantic Tubing	Cranston RI		
	Shintech	Freeport, Tex		
1975	Certain-teed	Lake Charles		
	Georgia Pacific	Plaquemine, La		
	Tenneco	Pasadena, Tex		

* My databank has no information on UCC before 1946 or BFG before 1950.

NB Some of the plants in this list were closed down some have changed ownership over the years.

TABLE 10CANADIAN PVC PRODUCERS - START-UP DATES vs ASL CASES

START-UP YEAR	COMPANY NAME	LOCATION	ASL CASE NUMBER	YEAR OF 1st EXPOSURE
1943 (1941?)	Goodrich	Shawinigan	01,02,03,04,05 06,07,08,09,10	44,43,41,45,44, 47,46,61,46,53
1951	Monsanto*	La. Salle		
1957	Goodrich	Welland		
1966	Esso	Sarnia		

* Terminated 1975

TABLE 11

EASTERN BLOC PVC FACTORIES - START-UP DATES vs ASL CASES

START-UP YEAR	COUNTRY NAME	COMPANY NAME	LOCATION	ASL CASE NUMBER	YEAR OF 1st Exposure
1941	Russia	State Comps	Vladimir et al		
1950	Yugoslavia	Jugo Vinil	Split	01,02,03,04	53,50,54,48
1951	Czechoslovakia	State Comps	Novaky	01,02	57,51
1955	East Germany	State-Comps	Bitterfeldt Schkopau		
1956	Rumania	State Comps	Icechim		
1957	Poland	State Comps	Oswiecim (Dwory)		
	Rumania	State Comps	Tirnaveni Turda		
1958	Rumania	State Comps	Risnov		
1959	Hungary	State Comps	Berente Borsod		
1961	Rumania	State Comps	Borzesti		
1963	Yugoslavia	Ohis	Skopje		
1965	Bulgaria	State Comps	Varna		
1967	Poland	State Comps	Tarnow		
1969	Russia	State Comps	Djerjinsk		
1970	Rumania	State Comps	Rimnicu Vilcea		
	Russia	State Comps	Volgograd		
1972	Yugoslavia	Vinilplastika	Zadar		
1975	Czechoslovakia	State Comps	Neratovice		
	Russia	State Comps	Kalush Area		
1976	Yugoslavia	Rip	Pancevo		
1977	Rumania	State Comps.	Rimnicu Vilcea		

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TABLE 12

JAPANESE PVC PRODUCERS - START-UP DATES vs ASL CASES

START-UP YEAR	COMPANY NAME	LOCATION	ASL CASE NUMBER	YEAR OF 1st EXPOSURE
1950	Chisso Corp Kanegafuchi Kag Tekkosha	Minamata Osaka Sakata		
1951	Mitsui Toatsu	Nagoya	01, 02	53, 58
1952	Mitsubishi Mon Sumitomo Kag	Yokkaichi Kikumoto		
1951	Denki Kagaku Nippon Zeon Toa Gosei	Shibukawa Kambara Tckushima		
1955	Ryo-Nichi	Uozu		
1956	Nippon Zeon Nisshin Kagaku	Takoaka Takeo		
1957	Kureha Kasei Shinetsu Kag	Nishiki Naoetsu		
1960	Denki Kagaku Kanegafuchi Kag	Ohmi Takasago		
1964	Chisso Corp	Chiba		
1966	Tokuyama Seksui	Tokuyama		
1967	San Arrow Kagak Sumitomo Kag	Tokuyama Chiba		
1968	Ryo-Nichi Shinetsu Kag	Mizushima Tokuyama		
1970	Chisso Corp Denki Kagaku Kanegafuchi Kag Kawasaki Yuki Mitsui Toatsu Nissan Kagaku Shinetsu Kag	Mizushima Goi (Chiba) Kashima Kawasaki Sakai Chiba Kashima		
1971	Tekkosha	Yokkaichi		
1973	Asahi Glass	Hayatsuki		
1974	Toyo Soda	Sakata Yokkaishi		
1975	Central Kagaku Toyo Soda	Kawasaki Yokkaichi		
1977	Unknown	Kashima		

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