



DOW CHEMICAL U.S.A.

R&S 103303

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23 August 1982

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ANGIOSARCOMA REGISTRY

Dr. John Stafford has kindly supplied an August 1982 update of the angio-sarcoma registry. Overall the number of cases is little different from the January edition, but as Dr. Stafford points out, this could be due to delayed reporting. It is extremely important that all information be supplied promptly to Dr. Stafford.

John is presenting a seminar at the Vinyl Chloride Safety Conference in Toronto, September 23 or 24.

Sincerely yours,

T. R. Torkelson, Sc.D.
Toxicology/Medical Liaison
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g

Enclosure

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ACKNOWLEDGEMENTS, SIGNIFICANT CHANGES AND COMMENTS

- 1 I should like to thank Dr Walter C Barnes, Jr, the Monsanto Occupational Medicine Physician advisor for the Springfield plant who gave Dr A Munn of the Monsanto Europe full details of US 32 (Dr Barnes letter of 24 February 1982). US 32 was diagnosed in 1979 and died in 1980.
- 2 Dr R Montesano of IARC in his letter of 6 April 1982 gave useful detailed information on some cases already published and notified a suspect case in Rumania. This case is being followed up with Prof Suciu. Dr Montesano mentioned another suspect case in France but the French PVC industry reports no evidence of ASL at the autopsy.
- 3 I am grateful to Dr W G F Adams and Dr Besché (Chief Medical Officer of Dynamit Nobel) for clearing up some of the problems of date of diagnosis and latency periods for cases 20, 21 and 22 in Germany. These cases now fall within a more usual pattern of death following six months or so after diagnosis of ASL. The data on case 19 have also been improved.
- 4 Dr R Spirtas of NCI, NIH Bethesda has asked whether all the ASL cases are white and male. He thought it important to record race and sex of cases. The two Japanese cases are of course male but not white. I would be grateful if recipients would let me know whether any of the other cases were not white males.
- 5 I am grateful to Dr J H Wilson for advice on more precise dates of start-up of the earliest European PVC plants and the amendments shown in Table 8. It is remarkable that BASF started production in 1931 at Ludwigshafen and have not had any ASL cases.
- 6 So far no ASL cases have been notified for 1982 and only 5 cases for 1981 of whom 1 case (an American) is still alive. Once more I am left wondering whether there is a real reduction in numbers of cases per annum or whether we are merely suffering from delays in diagnosis and reporting. Your continued help in keeping this register of ASL cases accurate and completely up to date is requested.

John Stafford
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 Health and Environment Protection
 ICI Petrochemicals and Plastics Division
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 Welwyn Garden City
 England

JS/LTE/9 August 1982

R&S 103305

IMPERIAL CHEMICAL INDUSTRIES PLC
PETROCHEMICALS AND PLASTICS DIVISION

LIVER ANGIOSARCOMA CASES (REVIEW DATA - 9 AUGUST 1981)

Table Sequence

Belgium	1	ASL Case Numbers by year of Death (Table 6)	32
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IMPERIAL CHEMICAL INDUSTRIES PLC
PETROCHEMICALS AND POLYMERS DIVISION

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LIVER Angiosarcoma Cases - (Review Date: 9 August 1982)

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
BELGIUM 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 1974-1980 ppm 1975- 50 ppm RETIRED 1 Feb 1975	Autocleaner 14 yrs Polyworker 3 yrs Farmer 15 yrs Work in glass ind. & chemi- cal industry	Driller in a foundry (2 yrs) Retired (Feb 1975) Hospitalised May 1976	Hepatic tests in Oct 1974 were normal. Retired Feb 1975 Hospitalised May 1976 Complete Clinical and career details have given in paper by Hublet et al in Arch. Belg Med. Soc., Hyg. Med., Trav. Med. Leg. 1977 pages 601-622

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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
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 P DELORIE in Annales d'Anatomie pathologique Paris, 1978 Vol 23 No 2 pp105-114 claims this case had both a hepatoma and ASL simultaneously.

LIVER Angiosarcoma Cases - (Review Date: 9 August 1982)

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

Sho
Cnp

R&S 103309

LIVER Angiosarcoma Cases - (Review Date: 9 August 1982)

R&S 103310

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>CZECHOSLO-</u> <u>VAKIA</u> 01		28.06.28	State Co	Novaky	01.07.57	24.12.73	45	16	16	24.12.73	Yes		Autoclave Cleaner	IARC letter of 1-4-82 giving details from Prof A David of Centre Ind Hygiene and Occ diseases.	
02		06.07.27	State Co	Novaky	01.11.50	27.11.64	37	14	15	26.11.64	Yes		Autoclave Cleaner	IARC letter of 1-4-82 gave somewhat altered dates for this case. I have accepted the changes since the dates come from Prof A David of the Centre of Industrial Hygiene and Occupational Diseases. My dates come originally from NIOSH.	

LIVER Angiosarcoma Cases - (Review Date: 9 August 1982)

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	HN	15.04.24	RP	Rouss- illon	00.01.46	18.02.67	43	21	19	19.02.67	Yes	High	Autoclave worker and cleaner 19 yrs		Ref. Ravier et al Arch. Mal. Prof. 1 30 n° 13 Nov 75 p 171-177
02	SHM	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- isation	Italian origin	Ref. G Bonneton et al "Nouvelle Presse Medicale" 15 Nov 1977 p 735
03	NAV	06.01.20	RP	St Fons	00.00.46	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 et al Arch. Mal. Prof. 1 37 n° 16 June 71 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	HN	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 hospital angiosarcoma (2)Scintigraphy found ASL (3)Haemorrhage from ASL (4)Right hepatectomy	Ref. P Couderc et al "Semaine des hopitaux" 10 Septembre 1976 Previously had bone angiosarcoma" Also Pillichowski et al "la Nouvell Presse Medical 17th July 1979 Page 2485

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FRANCE															
06	Pa	14.04.34	PCUK	Brignoud	01.03.58	12.08.76	42	18	13	11.09.76 (NIOSH says 12.09.76)	Yes	Moderate	(1958-1960) 12 yrs filtration 10-11 yrs polyworker (and works lab?)		(This man had AOL prior to AS. Ann. de Mal. 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 NIOSH says 00.07.76	49	26	22	02.07.76	Yes (NIOSH 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	A	01.04.34	Solvay	Tavaux	23.05.57	03.12.75	42	19	19	30.01.77	Yes	Moderate	16 yrs packer & autoclave clnr 14 yrs autoclave worker		Had been (tunnel worker previously)
09	IRFX	08.10.14	RP	St Fons	10.01.48	26.04.76	63	28	28	25.12.77	Yes	Very High 1948-1966 Lesser Exposure 1966-1976	Polymer- isation operator, autoclanner, 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 Paper by Dr Retz et al in Archives de Maladea Professionals Vol 40 No 6 1979 pages 741-3.

LIVER Angiosarcoma Cases - (Review Date: 9 August 1982)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
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France															
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 maitrise) 1972 retired		
12		16.08.14	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	Tavaux	23.09.63	26.06.79	40	16	13	22.08.79	Yes		Autocleaner 12 yrs, Auto- operator 10 yrs as operator 19 yrs, Copolymers 14 yrs	12 yrs as cycle mechanic. 1974. Ill at of 1977 due to Oesophageal varices. Surgical intervention 25.05.79 (right hepatectomy)	Cigarette smoker until 1974. Ill at of 1977 due to Oesophageal varices. Surgical intervention 25.05.79 (right hepatectomy)
14	HJ	05-04-24	Chloe Chimie (Formerly RP)	St Fons	1943	00.07.81	57	38	36	29.07.81	Yes	Very High	1943-1975 All types of maintenance work 1975-1979 in VCM Poly Process	1943-1975 All types of maintenance work 1975-1979 in VCM Poly Process	

LIVER Angiosarcoma Gases - (Review Date: 9 August 1982)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
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GERMANY															
01		00.00.30	Dynamit	Trotendorf	01.10.56	19.09.68	38	12	12	25.01.69	Yes (NIOSH)		Polyworker		
02		00.00.31	Dynamit	Trotendorf	14.10.57	25.09.70	39	13	11	14.12.71	Yes (NIOSH)		Polyworker		
03		00.00.30	Dynamit	Reinfel- den	09.06.52	00.03.73	43	21	16	10.10.73	Yes (NIOSH)		Filling pesticide aerosol cans with VC		Reported under (non polymer- isation workers in NIOSH list of 31.3.77. This of course is strictly incorrect. However I wonder whether this man had high exposure to VCN in his can filling operation?
04		00.00.30	Wacker	Burg- hausen	16.04.57	26.11.74	44	17	17	25.11.74	Yes (NIOSH)	200-500 ppm (but high during 1 yr autocleaner)	Polyworker & temporary autocleaner (for 1 yr)	1958 was autocleaner (for 1 yr)	Clinical details in paper by Gokel et al Virchows Arch A Path 1976 372 p 195-203

LIVER Angiosarcoma Cases - (Review Date: 9 August 1982)

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GERMANY															Confirmed
05 (NIOSH given as Case 06)		00.00.36	Hoechst	Frankfurt	02.04.60	10.12.73	38	13	05	16.12.74	Yes (NIOSH)		RG Chemie says "chemistry laboratorian" (in the Techno- logical Research Department" (NIOSH says assistant factory chemist which may be wrong (translation))		Reported under (non-polymer- isation workers in NIOSH list of 31.3.77 and 1.78. I don't think this is a correct classification by NIOSH. The man may have been involved in VCH (polymerisation) in pilot plant or in main plant.
06 (NIOSH given as Case 05)		00.00.32	Lonza	Waldshut	16.12.62	00.00.75	43	13	12	09.01.75	Yes		PVC - Manu- facture (Shift Leader)		
07		00.00.26	Wacker	Burg- hausen	15.04.54	12.11.75	49	21	21 (NIOSH 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	Dynemit	Troisdorf	19.07.54	06.04.75	58	21	22	25.12.75	Yes	?	Polyworker	?	

LIVER Angiosarcoma Cases - (Review Date: 9 August 1982)

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GERMANY															
09		00.00.34	CWH	Marl	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 11 yr		10/78 Confirmed Average exposure first 9 yrs 150 ppm, last 1000 ppm, Next 3 yrs av, 175 ppm. Last 1 yr av 35 ppm
10 (NIOSH gives as Case 11)		00.00.36	CWH	Marl	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, last 1000 ppm, last yr av 175 ppm. CWH letter of 21.04.78
11 (NIOSH gives as Case 10)		00.00.29	Wacker	Murg- hausen	10.10.55	28.06.77	47	22	22	28.06.77	Yes	High	13 yrs auto- clave cleaner 19 yrs filter operator		
12		00.00.38	Dynamit	Troisdorf	00.00.61	00.10.77	39	16	6	07.10.77	Yes	?	PVC Manu- facture Autoclave worker for 16 yrs		

LIVER Angiosarcoma Cases - (Review Date: 8 August 1982)

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
CEBHANY															
13		00.00.14	Lonza	Waldshut	00.00.60	08.04.78	63	18	14	19.05.78	Yes				(F W Best letter of 30th June 1980) enclosing data from Hr H P Friedel of BG Chemie
14											Not an Angiosarcoma In his letter of 21.12.81, Hr Friedel said this was a "Plattenepi- thelkarzinom Der Speiserohre" (a carcinoma of the oesophagus) not attribut- able to VCH & not recognised as an indust- rial disease				(F W Best letter of 30th June 1980) enclosing data from Hr H P Friedel of BG Chemie withdrawing this case
15	(NIOSH gives this as Case 13)	00.00.29	Wacker	Burghausen	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 INRW Report for 1978
16		00.00.23	Dynamit	Troisdorf	10.01.55	07.08.78	55	23	20	07.08.78	Yes ASL and Hepatocellular Carcinoma	High	Autoclave worker till 1964. Leader and master		(Angiosarcoma confirmed, full details of illness since March 1977 given in INRW Med Insp Rep for 1978.

LIVER Angiosarcoma Cases - (Review Date: 9 August 1982)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
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GERMANY 17 (NIOSH gives as Case 15)		00.00.37	Dynamit	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 given full details. Vinyl chloride disease diagnosed 02-02-73. Oesophageal varices. probably erro osteolysis.
18		00.00.13	Woechst	Gendorf	00.00.55	25.12.79	66	24	21	25.12.79	Yes		Autoclave Worker		
19		00.00.25	Dynamit	Troisdorf	18.10.54	00.08.79	54	25	18	22.02.80	Yes Metastasing ASL	High	Autoclave Worker		Dr Besche letter of 13-04-82 to Dr W G F Adams
20		00.00.15	Dynamit	Troisdorf	14.02.61	00.04.80	65	19	13	19.10.80	Yes Haemangio Endothelioma of liver with Metastases	High	Autoclave Worker		Dr Besche letter of 13-04-82 to Dr W G F Adams
21		00.00.13	Dynamit	Troisdorf	01.01.62	00.09.79 (pronounced clinical liver symptoms)	66	17	13	19.06.80	Yes Haemangio Endothelioma of liver with Metastases	High	Autoclave Worker and worked in drying shop		Dr Besche letter of 13-04-82 to Dr W G F Adams
22		00.00.21	Dynamit	Troisdorf	15.10.61	17-09-80	59	18	11	06.12.81	Yes Metastasing ASL	High	Autoclave Worker	Chargehand, subsequently Foreman	Dr Besche letter of 13-04-82 to Dr W G F Adams

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* Should this case be removed from the list? NIOSH have it on their supplementary list relating to non-polymerisation workers exposed to VCM.

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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
ITALY															
01 (On NIOSH supple- mentary list)	LC	15.06.34	PANSAC		00.00.65	19.04.71	36	06	03	16.04.71	Yes		PVC Bag extruder		* Primary tumour may have been pericardium. Not homo- geneous with other cases. ** ***
02	SE	13.11.29	Montedison	Porto Marghera	00.00.57	13.12.72	43	15	06	27.12.72	Yes		Polyworker		** ***
03	VG	14.03.20	Solvay	Ferrara	00.01.53	10.07.75	55	22	21	10.07.75	Yes	High	Autocleaner (8 yrs (1953- 61) Autoclave operator (12 yrs (1961- 72)	1972-5 did a variety of jobs including PVC packing.	***
04	FB	20.07.37	ANIC	Ravenna	00.04.59	00.01.81	43	21	21	30.03.81	Yes	12 yrs - Very High 5 yrs - Medium 4 yrs - Low	11 yr - Monomer operator 20 yrs - Autoclave operator & other duties (in suspens- ion polymer- isation. Area Foreman (in same Dept) since 1975.		***

** See Milioni Med del Lavoro 65 p445, 1974. Further details in letter from Dr Montesano of IARC on April 1st 1982.

*** Also see Milioni and Roncinelli in Acta Oncologica Vol 1 1980 pages 35 - 49. (ICI has made a translation of this paper into English and copies of the translation can be made available on request).

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JAPAN															
01	Tomoji Mori	01.08.22	Hitsui Tosatsu (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

* In his letter of 1st April 1982, Dr Montenegro of IARC says Japanese Ministry of Labour give

Date of diagnosis - 21-08-74
Age of diagnosis - 52
Years of exposure - 22

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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	NH	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	00.03.45	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 B Byren letter 16.8.77 to CEFIC
05		12.03.19	Kemanord	Sundsvall	11.05.64	22.11.80	61	16	16	22.11.80	Yes	High - 6 Years Low - 10 Years	1964-1970 centrifuge operator 1970-1980 drier operator		Letter of 2nd Nov 1981 from Dr David Byren

* In his letter of 1st April 1982, Dr Montesano of IARC says in Sweden's National Board of OH Health gives 20-02-70 as date of diagnosis for Case 01 and 15-05-72 for Case 02.

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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	Hillhouse	04.04.44	03.12.72 (Fox & Collier paper says 23.12.72)	71	28	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		Lee and Harry Lancet 29-06074 pages 1316-8
02															Dubious fabrication case
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	Hillhouse	26.04.54	00.06.79	59	25	18	12.10.79	Yes	Medium- high	54-5 Bagging Plant 55-6 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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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	Barry	08.01.51	00.10.79	65	28	21	19.11.79			1951-52 Polycleaner 1952-55 Latex 1955-60 Polyfloor 1960-64 Poly Chargeland 1964-70 Charging operator 1970-72 Drier operator		
06	GEP	1931	BP	Barry	1962	09.01.80	48/9	18	12	09.01.80			17 yrs Poly Floor operator 15 yrs Greaser on Poly Floor Polycleaner 1963-5 Recovery 1965-1971		
07	RGB	26.04.20	BP	Barry	1963	00.00.80	60	17		13.06.80			Polycleaner 1963-5 Recovery 1965-1971		
08	ITH	08.05.24	BP	Barry	19.09.50	24.11.81	57	31	24	25.12.81			1950-51 Autoclave operator 1951-1957 Chargeman autoclave building 1957-1974 Shift supervisor autoclave building - Never cleaned autoclaves but supervisor's job entailed entering autoclaves to inspect them		

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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 01	Earl Parks	17.10.23	RFC	Louis- ville	09.12.48	03.03.73	49	24	21	03.03.73	Yes		Pot Cleaner (Block Jama 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 Jama 1.7.74 p 53
02		19.08.33	RFC	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 JAMA 1.7.74 p 53
03	Edward Dinwiddie	25.05.15	RFC	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	RFC	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	RFC	Louis- ville	19.06.44	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	RFC	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	08.08.61	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 (Gettle- Finger)	08.11.31	BFG	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	Niagara	12.06.51	00.05.68	55	17	17	10.05.68	Yes				(Ref 1
11		27.05.09	Goodyear	Niagara	14.10.46	00.03.70	61	23	23	16.03.70	Yes				(Ref 1
12	Francis A Sachman	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. Rigger 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 NCA
13	Richard Edward Clendenin	01.12.21	UCC	S Charle- ston	11.12.42	00.05.74	52	32	26	07.04.74	Yes	2000 ppm			(Charleston Daily Mail 21.7.75
14															(Dubious fabrication case
15															(Dubious fabrication case

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USA
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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 VCH (polymer- isation	From 1954 onwards in Army and other service. 46-50 Army	Table 4 in (Wagoner Testimony to US Senate (Confirmed in M N Johnson 1tr 07.08.78
17	Peerenboom	06.05.31	BFG	Louis- ville	23.06.55	11.10.74	43	19	19	16.10.80	Yes on 11.10.74 but no post-mortem 16.10.80				Dr M N Johnson letter of 24.2.81 con- firmed death 16 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 Betal plasticiser 6 Carbonet operation	Navy Tyre Store	Confirmed in M N Johnson 1tr 07.08.78 Also Rolling Stone mag. 15.01.76	
19	Virgil Christian	00.00.15	UCC	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	Niagara	00.00.55	30.01.76	58	21	18	30.01.76	Yes				NIOSH letter of 25.10.79
21	Chester Winkie	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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AUK system of dates
DAY - MONTH - YEAR

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															
22		02.10.23	BFG	Louisville	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 Mellin Lane of whom B had died by 26.1.76 In his letter of 16.09.81 Dr H N Johnson confirms this is the case described by Dannaher Tamburro & Yam in Feb 1980 Am J Medicine Vol 70 p280
23		00.00.23	Great American Chemical Company	Pitchburg Mass.	08.09.38	06.04.73	50	15	14	06.04.73	Yes				
24	Charles Edward Moore	17.05.17	UCC	8 Charleston	1939	27.05.77	60	38	24? (NIOSH says 26)	27.05.77	Cholangio-sarcoma (R Kaminaki 26/2/79)	Medium to high for 24 yrs	1941-65 non-solvent vinyl resin unit and dispersal unit first as fitter helper, then shift utility man	1917-39 was off and on labourer 1939-41 may have been exposed as reactor cleaner 1943 became shift fitter 1946 became shift utility man	1941-65 non-solvent vinyl resin unit and dispersal unit first as fitter helper, then shift utility man 1917-39 was off and on labourer 1939-41 may have been exposed as reactor cleaner 1943 became shift fitter 1946 became shift utility man
(25)															Removal from register confirmed in R Kaminaki letter of 5 November 1980 R N Wheeler letter of 20/2/79 and Rose Kaminaki letters of 26/2/79 and 25/11/80

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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	BPC	Louisville	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 VCH, probably high	Various jobs in PVC plants from cold room to paste recovery to PVC charging operator to paste charging. 111 August 1965. Terminated employment Jan 1966		R Kaminski letter of 26/2/79 and Prof. Tumbarello letter of 19/1/79
27	J L Forrest	11.05.16	UCC	S Charleston	01.07.41	30.11.78	62	37	26 (NIOSH 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	S Charleston	00.08.44	03.11.78	61	34	33	03.11.78	Yes				R Kaminski letter of 16/4/79
29		12.10.07	UCC	S Charleston	00.05.42	00.03.80	72	38	16	01.03.80	Yes				R Kaminski letter of 19th June 1980 16 5th Nov 1980
30	WVN	22.07.22	Tenneco Chemicals	Flemington	11.06.64	30.12.80	58	17	15	30.12.80	Yes	6 - Unknown 9 - Minimal	Maintenance Mechanic 16 yrs (Elsewhere 11 yrs Boiler House Operator 9 yrs		
31		08.11.23	UCC	S Charleston	12.05.46	01.08.81	57	35	13	Alive	Yes	High (but not as high as reactor cleaner (would (experience) (Worked as (labourer (from (June 1941 (to May 1946) (and may (have (cleaned (reactors in (that time	Chemical Operator in charge reactor (experience) (Foreman Aliphatic Chemical Operation	From 1959 to 1976 Aliphatic Chemicals operator and from July 1976 to date (Foreman Aliphatic Chemical Operation	Dr Racey letter 16.10.81 and R N Wheeler letter of 19.11.81

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*UK system of date
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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
US 32	C W Giroux	22-02-08	Monsanto	Springfield Mass	15-10-51	00-07-79	71	28	14 (in PVC autoclave area)	17-05-80	An autopsy was done and immediate cause of death given as "Angiosarcoma"	The death certificate gave "Mr Giroux" usual occupation as "kettle operator" in and "chemicals industry".	1940-1951 Various jobs in polymer manufacture BUTVAN LUSTREX 1951-1964 Various jobs in and around PVC autoclaves 1964-1973 Various clerical jobs in PVC polymerisation facility/ Retired 01-03-73.		Information given in letter of 24 February 1982 from Dr Walter C Barnes of Monsanto Springfield to Dr A Hunn of Monsanto Europe.

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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 et 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 Spirtan of NIOSH changed the status of Case 02 to VCH production employee. Dr Spirtan 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		11.06.10	Jugo Vinil	Split	15.12.58	03.09.78	46	20	18	03.09.78	Yes				(Rosa Kaminski letter of 19th June 1980 and IARC letter of 1 April 1982

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Incidence of ASL Cases Per AnnumBy date of death

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	5
1980	10
1	4
2	0
Total	<u>98</u>

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

2 The 1977 total includes US case 24 which is a Cholangiosarcoma.

3 The 1981 total does not include US 31 who is alive.

Distribution of ASL Cases by Country

USA	29 ***
W Germany	21 **
France	14
Canada	10
UK	7
Sweden	5 ****
Yugoslavia	4 *****
Italy	3 *
Czechosl vakia	2
Japan	2
Belgium	1
Norway	1
	—
Total	99
	—

* Omit It01 - atypical case of PVC bag extruder.

** Includes GE03 aerosol can filler.

*** Includes case US 24 which was diagnosed as Cholangiosarcoma & US 31 who is ALIVE.

**** Includes one monomer worker.

***** Includes two monomer workers.

i.e Western Europe	52
North America	39
Rest of World	8
	—
Total	99
	—

Pattern of ASL Cases by Factory(a) W Europe

Of the 52 cases in W Europe, 42 have occurred in clusters at 10 factories. Of the 21 German cases, 18 have occurred in clusters at 4 factories.

	<u>ASL Cases</u>
Kemanord, Sundsvall	5
PCUK, Brignoud	5
Dynamit, Troisdorf	10
Chloe Chimie (Formerly RP), St Fons	5
Wacker, Burghausen	4
CWH, Marl	2
ICI, Hillhouse	2
BP, Barry	5
Solvay, Tavaux	2
Lonza, Waldshut	2
	<u>42</u>

NB: There are 31 pre 1962 PVC plants in W Europe; 18 of these have had ASL cases (Ref Table 8)

(b) N America

Of the 39 cases in N America, 34 have occurred at four factories out of a total of 49 factories - in N America 40 plants have not had ASL cases.

	<u>ASL Cases</u>
BFG, Shawinigan	10
BFG, Louisville	11
UCC, S Charleston	9
Goodyear, Niagara	4
	<u>34</u>

NB: There are 29 pre 1962 PVC plants in N America; 9 of these have had ASL cases (Ref Tables 9 & 10)

(c) Rest of World

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

Latency 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	14	336	24 *
	Germany	21	385	18.3 *
	Italy	3	58	19.3
	Norway	1	22	22
	Sweden	5	122	24.5
	UK	<u>7</u>	<u>156</u>	<u>22.3</u>
		<u>52</u>	<u>1097</u>	<u>21.1</u>
<u>N America</u>				
	US	29	714	24.6 *
	Canada	<u>10</u>	<u>204</u>	<u>20.4</u> *
		<u>39</u>	<u>918</u>	<u>23.5</u>
<u>Rest of World</u>				
	Czechoslovakia	2	30	15.0
	Japan	2	39	19.5
	Yugoslavia	<u>4</u>	<u>85</u>	<u>21.2</u>
		<u>8</u>	<u>154</u>	<u>19.2</u>
<u>Summary</u>				
	W Europe	52	1097	21.1
	N America	39	918	23.5
	Rest of World	<u>8</u>	<u>154</u>	<u>19.2</u>
		<u>99</u>	<u>2169</u>	<u>21.9</u>

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

	0-9 yrs	10-14 yrs	15-19 yrs	20-24 yrs	25-29 yrs	30-34 yrs	35+ yrs	Total	Average Latency Period
Belgium			1					1	18
Canada		3		5	2			10	20.4
Czechoslovakia		1	1					2	15.0
France		1	4	2	4	1	2	14	24
Germany		4	9	6*	2			21	18.3
Italy			1	2				3	19.3
Japan			1	1				2	19.5
Norway				1				1	22
Sweden			2		2	1		5	24.5
UK	1		2		3	1		7	22.3
USA		2	7	7	5	4	4	29	24.6
Yugoslavia				4				4	21.2
TOTAL	1	11	28	28	18	7	6	99	21.9

* Includes G 03 aerosol can filler

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

	Western Europe	North America	Rest of World	Annual Total	Cumulative Total	Key Events
1955		1		1	1	
7		1		1	2	
1961		1		1	3	
2		1		1	4	
4		1	1	2	6	
7	1			1	7	
8		5		5	12	
9	1	2		3	15	
1970	1	1		2	17	Viola
1	1	2		3	20	
2	4	1		5	25	
3	1	4	3	8	33	Maltoni
4	3	2	-	5	38	Goodrich
5	6	4	1	11	49	
6	6	3	2	11	60	
7	6	3		9	69	
8	7	2	1	10	79	
9	5	-	-	5	84	
1980	6	4	-	10	94	
1	4	***	-	4	98	
2	nil to date	nil to date	nil to date	nil to date		
Total	52 *	38**	8	98**		

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

** Does not include US31 still alive.

TABLE 6

ASL CASE NUMBERS BY YEAR OF DEATH AND GEOGRAPHICAL LOCATIONS (EXCLUDING IT01)

KEY EVENTS		WESTERN EUROPE	NORTH AMERICA	REST OF WORLD
	1955		C1	
	6			
	7		C2	
	8			
	9			
	1960			
	1		US8	
	2		C3	
	3			
	4		US5	Cz2
	5			
	6			
	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,Cz1
Goodrich	4	G4,G5,UK3	C9,US13	
	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,G18		
	1980	UK6, UK7,G19,Sw5,G20,G21	US17, US29, US30, US32	
	1	It4,F14,UK8,G22		
	2			
	Total	52	38***	8

* Cholangiosarcoma

** Aerosol Can Filler

*** Does not include US31 still ALIVE

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TABLE 7

ASL CASE NUMBERS BY YEAR OF FIRST EXPOSURE AND GEOGRAPHICAL LOCATION
(EXCLUDING IT01)

KEY EVENTS		WESTERN EUROPE	NORTH AMERICA	REST OF WORLD
	1939		US24*	
	40			
	1	Fr11	C3,US27	
	2		US13, US29	
	3	Fr14	C2,US19	
	4	UK1	C1,C5,US5,US7,US28	
	5	Sw2	C4,US3,US9	
	6	Fr1,Fr3,Sw4	C7,C9,US8,US11,US21,US31***	
	7	Sw3	C6,US22,US26	
	8	Fr9	US1	
	9	Fr12,Fr4	US12	
	50	Fr7,N1,UK81	US16	Y2, Cz2
	1	Sw1,UK5	US10, US32	
	2	G3**	US4	
	3	G15,It3	C10	Jap1,Y1
	4	G7,G8,UK4,G19	US18	Y3
	5	G11,G16,G18	US2,US17,US20	
	6	FR10,G1		
	7	Fr8,G4,It2,G2		Cz1
	8	Fr6,B1	US23	Jap2,Y4
	9	Fr2,It4		
	60	G5,G13		
	1	G9,G10,G12,G17,G20,G22	C8	
	2	G6,UK6,G21	US6	
	3	Fr13, UK7		
	4	Sw5	US30	
	5	Fr5		
	6	UK3		
	7			
	8			
	9			
Viola	70			
	1			
	2			
Maltoni	3			
	Total	52	39	8

* Cholangiosarcoma

** Aerosol Can Filler

*** US31 is still ALIVE

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TABLE 8

WESTERN EUROPE PVC PRODUCERS - START-UP DATES vs ASL CASES (OMITTING G03)

START-UP YEAR	COUNTRY NAME	COMPANY NAME	LOCATION	ASL CASE NUMBER	YEAR OF 1st Exposure
1931	West Germany	BASF	Ludwigshafen		
1933	West Germany	Wacker	Burghausen	04,07,11,15	57,54,55,53
1938	Italy	Montecatini	Acna		
1939	France	Rhone Poulenc	St Fons	03,09,10,11,14	46,48,56,41,43
1940	United Kingdom	ICI	Runcorn		
1940	United Kingdom	ICI	Hillhouse	01,04	44,54
1945	Sweden	Kemanord	Sundsvall(Stockvik)	01,02,03,04,05	51,45,47,46,64
	Switzerland	Lonza	Lalden (Visp)		
1946	France	Rhone-Poulenc	Rousillon	01	46
1947	Italy	Montedison	Porto Marghera	02	57
1948	United Kingdom	BP Chem	Barry	03,05,06,07,08	66,51,62,63,50
	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	18	55
1954	West Germany	Dynamit	Troisdorf	01,02,08,12,16, 17,19,20,21,22	56,57,54,61,55, 61,54,61,62,61
1955	Spain	Monsanto Iberia	Monzon		
1956	Spain	Caiqsa	Sabinanigo		
		Hispavic	Torrelavega		
1958	West Germany	Solvay	Rheinberg		
1960	Italy	S C Ravenna	Ravenna	04	59
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 Sardina		
1970	Italy	SIR	Porto Torres Sar		
	United Kingdom	ICI	Runcorn		
1971	Italy	S C Ravenna	Ravenna		
	Spain	Hispavic	Martorell		
	Sweden	Kemanord	Stenungsund		
	United Kingdom	BP Chem	Baglan Bay		
1972	Finland	Pekema	Svartback		
	Holland	DSM	Beek Limburg		
1976	France	Soc Art D'vinyl	Mazingarbe		
1977	Spain	M nsanto Iberia	Tarragona		

* Laboratory worker in Research Department

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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, 27,28,29,31	44,42,43,46 39,41,44,42,46
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	32	51
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	Fitchburg	23	58
	Hooker	Hicksville		
	Pantasote	Passaic		
1957	Atlantic Tubing	Cranston		
	Tenneco	Flemington NJ	30	59
1958	Keysor Century	Saugus, Cal		
1960	BFG	Watson, Cal		
	Air Products	Calvert City		
	Borden	Illioopolis		
1962	Tenneco	Burlington 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		
	(Formerly Conoco)			
1971	Conoco	Oklahoma City		
1972	Nat Starch	Meredosia, Ill		
1973	Borden	Springfield		
	Robintech	Painesville, O		
	(Formerly Allied?)			
1974	Atlantic Tubing	Cranston RI		
	Shintech	Freeport, Tex		
1975	Certain-teed	Lake Charles		
	Georgia Pacific	Plaquemine, La		
	Tenneco	Pasadena, Tex		
1979	Firestone	Plaquemine		

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

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

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TABLE 10

CANADIAN 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		
1979	Diamond Shamrock Alb	Fort Saskatchewan		

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* Terminated 1975

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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
Pre 1939	East Germany	State Company	Schopau		
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	57,50
1955	East Germany	State Comps	Bitterfeldt		
1956	Rumania	State Comps	Icechim		
1957	Poland	State Comps	Osweicim (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	Hip	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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TABLE 13

SOUTH AND CENTRAL AMERICAN PVC PRODUCERS

START-UP YEAR	COMPANY NAME	LOCATION	ASL CASE NUMBER	YEAR OF 1st EXPOSURE
1953	Monsanto Mexica	Lecheria (Mexico)		
1954	Policyd	Mexico City (Mexico)		
1955	Geon Do Brazil	Sao Paulo (Brazil)		
1956	Elchlor	Sao Caetano (Brazil)		
1960	Electrochlor	Capitan Bermudez (Argentina)		
	Viplastic	Mendoz (Argentina)		
1961	Indupa	Cinco Saltos (Argentina)		
1965	SOC Paramanga	Paramonga (Peru)		
	PET Columbiana	Cartagena (Colombia)		
1966	Carburo De Col	Medellin (Colombia)		
1967	Plasticos Omega	Mexico		
1968	Primex	Puebla (Mexico)		
1970	Policasa	Managua (Nicaragua)		
	Petro Dow	Conception (Chile)		
1971	Polimeros Mex	St Martin Puebla (Mexico)		
1975	Rico Chemicals	Guyanilla (Puerto Rico)		
1976	Petroplas	EL Tablazo (Venezuela)		
1977	Indust Resistoc	Tlaxcala (Mexico)		
1978	Huls Brasil	Cubato (Brazil)		
	Polychem	El Salvador		
	Policyd	Coatzacoalcos (Mexico)		
1979	PET Camacari	Camacari Bahia (Brazil)		

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