

Liver Angiosarcoma Cases

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IMPERIAL CHEMICAL INDUSTRIES PLC
PETROCHEMICALS AND PLASTICS DIVISION

LIVER ANGIOSARCOMA CASES (REVIEW DATE - 1 JANUARY 1984)

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LIVER Angiosarcoma Cases - (Review Date: 1 Jan 1984)

* 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
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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
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

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

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CZECHOSLO- VAKIA															
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 11-4-82 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 HOSH.	

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France
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FRANCE															
06	Pa	14.04.34	PCIM	Brignood	01.03.58	12.08.76	42	18	13	11.09.76 (NIOSH says 12.09.76)	Yes	Moderate	(1958-1960) 12 yrs filtration 10-15 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 AOL
07	GIR	26.04.27	RP	St Auban	01.07.50	After death NIOSH says 08.07.76	49	26	22	02.07.76	Yes (NIOSH no comment)	High	Plant fore- man in polymer- isation	1972-6 admin section in St Auban	Diad of septicemic small liver lesion found after autopsy
08	a	01.04.34	Solvay	Tavern	23.05.57	03.12.75	42	19	19	30.01.77	Yes	Moderate	16 yrs packer 16 autoclave cler 14 yrs autoclave worker		Had been tunnel worker previously
09	HPX	08.10.14	RP	St Pons	10.01.48	26.04.76	63	28	28	25.12.77	Yes	Very High 1948-1966 Lesser Exposure 1966-1976	Polymer- isation operator, autoclave, autoclave maintenance	10 yrs in sulphuric acid factory, interceptor & general services	Operated 4.76 for removal of tumour from liver and died after second surgical operation for bilio bronchial fistula Paper by Dr Day et al in Archives de Medecine Professionale Vol 40 No 6 1979 pages 741-3.

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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>France</u>															
15	DEP	03.01.37	Chico Chimie (formerly RP)	St Pons	07.07.55	28.09.82	45	27	27	Alive	Yes	High-20 yr Moderate 17 yrs	Autoclave cleaner 1955-1962 autoclave operator 1962-1982		J C Contesse Letter of 15 10 1983
16	GIN	13.07.22	Chico Chimie (formerly RP)	St Pons	27.10.41	05.01.83	61	41	38	Alive	Yes	High-33 yrs Moderate- Low - 5 yrs	Polymerant- ion Process Man Maintenance Worker Health & Safety Agent		Retired Jan 1979. J C Contesse Letter of 15 10 1983
17	HAR	22.02.23	Chico Chimie (formerly RP)	St Pons	17.06.48	03.04.83	60	34	28	03.04.83	Yes	High - 23 yrs	Autoclave Cleaner 1948-1971	Other sectors of St Pons Factory 1971- 1978	Retired 01.01.79 J C Contesse Letter of 15 10 1983

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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
GERMANY 85 (NIOSH given as Case 86)		00.00.34	Hoechst	Frankfurt	02.04.60	10.12.73	38	13	05	16.12.74	Yes (NIOSH)		IG Chemie says "chemistry laboratorian in the Techno- logical Research Department" (NIOSH says assistant factory chemist which may be wrong translation)		Confirmed Reported under non-polymer- ization workers in NIOSH list of 13.3.77 and 1.78. I don't think this is a correct classification by NIOSH. The man may have been involved in VCM polymerization in pilot plant or in main plant.
86 (NIOSH given as Case 85)		00.00.32	Lenze	Waldshut	16.12.62	00.00.75	43	13	12	09.01.75	Yes		PVC - Manu- facture Shift Leader		
87		00.00.26	Hecker	Burg- hausen	15.04.54	12.11.75	49	21	21 (NIOSH says 12)	15.11.75	Yes		PVC Manu- facture and all work incl auto- cleaning 12 yrs (1954-66) Foreman Tech Dev 8 yrs (1967-1975)		
88		00.00.17	Dynanite	Troisdorf	19.07.54	06.04.75	58	20	20	25.12.75	Yes	?	Polymerker		

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GERMANY															
13		08.08.14	Lenze	Waldshut	08.08.60	08.04.78	63	18	14	19.03.78	Yes				P W Root letter of 10th June 1980 [enclosing data] from Mr H P Friedel of MC Chemie
14											Not an Angiosarcoma [in his letter of 21.12.81, Mr Friedel said this was a "Pilocystic- [theliosarcoma [Der [Speiserohre" [a carcinoma of the [oesophagus) not attribut- able to VCM & not recognized as an indust- rial disease				P W Root letter of 10th June 1980 [enclosing data] from H P Friedel of MC Chemie [withdrawing this case
15	(NIOBH gives this as Case 13)	08.08.29	Wacker	Burghausen	19.10.53	09.10.78	49	25	25	25.10.78	Yes	1	Autoclave cleaner and worker. Drier operator. Later shift leader		Angiosarcoma [confirmed [09/79. Some [detail of this [is also cases [19, 13, 15, 16 [is 17 given in [MMW Report for [1978
16		08.08.23	Dynamic	Troisdorf	10.01.55	07.08.78 ([Lalbach [suspected [ASL at [Feb 1975 [laparotomy)	55	23	28	07.08.78	Yes [ASL and [Hepatocellular [Carcinoma	High	Autoclave worker till 1964, Leader and master		Angiosarcoma [confirmed, [Full details [of illness [since March [1973 given in [MMW Med Insp [Rep for 1978. [Different [details given [in "VC [Associated [Disease" by [Lalbach and [Wortellic [1981) p71.

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

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JS 1/8/77

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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
ITALY															
01 (On NIOSH supplementary list)	LO	15.06.34	PANBAC		00.00.65	19.04.71	36	06	01	16.04.71	Yes		PVC Bag extruder		Primary tumour may have been pericardium. Not homogeneous with other cases. ^{aa} ^{aaa}
02	BE	13.11.29	Montedison	Porte Marghera	00.00.57	13.12.72	43	15	06	27.12.72	Yes		Polyworker		^{aa} ^{aaa}
03	VC	14.03.20	Bolvay	Ferrara	00.01.53	10.07.75	55	22	21	10.07.75	Yes	High	Autocleaner 18 yrs (1953-61) Autoclave operator 12 yrs (1961-72)	1972-5 did a variety of jobs including PVC packing.	^{aaa}
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 suspension polymerization. Area Foreman in same Dept since 1975.	Never cleaned autoclaves. See paper by CHIAPPINO at Al Med Lavoro Vol 6 (1982) pp 555-563	Non-smoker. Consumed little alcohol. No ADL. ^{aa}
05	G Bonasia	19.03.37	Ponasa	Mira Venice	00.00.67	07.03.83	46	16	8	06.04.83	Yes	Medium-2 High	Bag extruder 1967-1975 Commercial Dept 1976-1983		18 Paglia-lunga taken at 12 Aug 1983

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^{aa} See Maltoni Med di Lavoro 51 p445, 1974. Further details in letter from Dr Montecano of IARC on April 1st 1982.

^{aaa} Also see Maltoni and Bondinella 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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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 CANCER HIGHLIGHTS	OTHER COMMENTS
<u>NORMAN</u> 01	AN	23.12.15	Norok Hydro	Noroka	00.03.50	21.12.71	56	22	21	04.01.72	Yes	High	Foreman & Autoclave supervisor		Confirmed by Dr Thilo- Evanson of NH. At AFME Mtg of 19 June 1978 Mr P Saenger stated that AN had been a member of a start-up team. VCH & PVC were made in same building. The VCH was made from acetylene

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01	WJ	28.04.01	ICI	Millhouse	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 29-06-74 pages 1316-8
02															Dubious fabrication case
03	BJM	02.06.37	BP	Barry	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	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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UK 09	KICP	07.05.25	BP	Barry	15.02.50	02.03.83	30	33	29	24.02.83	Yes	Medium	Polymeriser	12 years on Acrylonitrile Buna Plant. Also prior to 1950. 4 years RAF maintenance. 3 years motor car paintshop. 12 years in Graving Dock.	

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USA
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UK system of dates
DAY - MONTH - YEAR

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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 Gottlieb	08.11.31	BFG	Louis- ville	28.05.45	01.03.76	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 Bochman	17.11.18	Pirestone	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 area cleaned (autoclaves)	Utility & Service op. Bagger Bryar op. stripping op. 13 yrs prior service in tyre plant	[Ref 1 + letter of 26 April 1978 from Russell A Park to J T Samuel of MCA
13	Richard Edward Clendenia	01.12.21	MOC	Charle- ston	11.12.42	00.05.74	32	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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22		1921.10.23	BFG	Louisville	11.07.47	00.01.76	52	29	20	104.12.76	Yes				Louisville Times 26.1.76 said he was the 18th AS victim at Delta Lane of whom 8 had died by 26.1.76. In his letter of 16.09.81 Dr M D Johnson confirms this is the same described by Bannister (Tomburro & You) in Feb 1980. Am J Medicine Vol 70 p200
23		00.00.21	Great American Chemical Company	Fitchburg Mass.	00.09.58	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	247 (NIOSH says 26)	27.05.77	Cholangio-carcinoma (R Kaminski 26/2/79)	Medium to high for 24 yrs	1941-65 non-solvent vinyl resin unit and [dispersion vinyl resins]exposed as unit first reactor for filter cleaner [helper, then]shift filter utility man [retains on]26.04.63 employment was terminated	1937-39 was off and on labourer [1939-41 may have been]exposed as reactor cleaner [1943 became]shift filter [1946 became]shift utility [retains on]26.04.63 employment was terminated	M H Wheeler letter of 18.8.77 to J Stanford gives details of these Kaminski letter of 26/2/79 R Kaminski letter of 5 Nov 1980 suggests that NIOSH will register since this neoplasm may be associated with AS.

(15)

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Removal from register confirmed in R Kaminski letter of 5 November 1980

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PLASTICS DIVISION

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*UK system of date
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
US 32	C M Giroux	22-02-08	Monasato	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 "bottle operator" in and "chemicals around PVC industry".	1940-1951 Various jobs in polymer manufacture DUTVAX LUSTREX 1951-1964 Various jobs in and around PVC autoclaves 1964-1973 Various clerical jobs in PVC polymerization facility/ Retired 01-03-73.		Information given in letter of 24 February 1982 from Dr Walter C Barnea of Monasato Springfield to Dr A Mann of Monasato Europe.
US 33	S Ferguson Jar	08-10-27	BPO	Louisville	09-09-54	11-05-82	54	28	28	Alive	Yes		Multiple jobs including Poly Operator + Polycleaner.		Prof Tambura letter of 12 Aug 1982 + Dr M H Johnson letter of 20 Feb 1983.
US 34	Mr Byrum	29-01-34	BPO	Louisville	1955	03-11-82	48	27	10	Alive	Yes + Leiomyosarcoma		Poly Operator + Autoclave Cleaner 1955-65.	1965 left BPO to become a Clergymen.	Dr M H Johnson letter of 13 Nov 1982 and 20 Feb 1983.
US 35		09-03-12	UCC	S Charle- ston	23-07-44	18-07-83	61	39	14	18-07-83	Yes	High from 1944 to 1955. Medium from 1955-1958			Dr Dacey letter of 15 Sept 1983.
US 36		27-08-32	The General Tire and Rubber Co	Ashrab Uia	11-06-56	21-08-83	50	27	27	Alive	Yes	Moderate	1956-56 labourer 1956-57 prod helper 1957-70 operator 1970-75 electrician 1975-present operator		A M Landrie letter of 12 Sept 1983 reported at medical May 1983. Testing commenced May 1983

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TABLE 1Incidence 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	2
5	0
6	0
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	1
3	4
Total	<u>103</u>

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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 1982 total does not include US 33 and 34 who are alive and F 15 who is alive.
- 4 The 1983 total does not include US 36 and F 16, who are alive.

TABLE 3Pattern of ASL Cases by Factory(a) W Eur pe

Of the 57 cases in W Europe, 46 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 Pons	8
Wacker, Burghausen	4
CWH, Marl	2
ICI, Hillhouse	2
BP, Barry	6
Solvay, Tavaux	2
Lonza, Waldshut	2
	<u>46</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 43 cases in N America, 37 have occurred at four factories out of a total of 49 factories - in N America 39 plants have not had ASL cases.

	<u>ASL Cases</u>
BFG, Shawinigan	10
BFG, Louisville	13
UCC, 8 Charleston	10
Goodyear, Niagara	4
	<u>37</u>

NB: There are 29 pre 1962 PVC plants in N America; 10 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.

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(Review Date - 1 Jan 1984)

DISTRIBUTION OF LATENCY PERIODS

TABLE 4B

Page 32

	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	5	2	3	17	25.76
Germany		4	9	6*	2			21	18.3
Italy			2	2				4	18.5
Japan			1	1				2	19.5
Norway				1				1	22
Sweden			2		2	1		5	24.5
UK	1		2		3	2		8	23.62
USA		2	7	7	8	4	5	33	25.30
Yugoslavia				4				4	21.2
TOTAL	1	11	29	28	22	9	8	108	22.60

* Includes G 03 aerosol can filler

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TABLE 4D

LATENCY PERIODS OF ASL CASES TABULATED BY YEAR OF FIRST EXPOSURE AND GEOGRAPHICAL LOCATION

MAX POSSIBLE LATENCY PERIOD	YEAR OF FIRST EXPOSURE	LATENCY PERIODS IN		
		WESTERN EUROPE	NORTH AMERICA	ROW
44	1939		38*	
43	1940			
42	1	37,41***	21,37	
41	2		32,38	
40	3	38	14,32	
	4	28	11,24,20,24,34,39	
	5	27	22,28,29	
	6	21,29,31,33	26,28,15,23,30,35***	
36	7	29	24,29,28	
35	8	28,34	24	
	9	30,26	20	
	1950	26,22,31	19	23,14
	1	19,28	17,28	
31	2	21**	15	
30	3	25,22	23	22,20
	4	21,21,25,25	21,28***	22
	5	22,23,24,27***	14,19,21,27***	
	6	21,12	27***	
26	7	19,17,15,13		16
25	8	18,18	15	17,20
	9	16,21		
	1960	13,18		
	1	15,16,16,16,19,18	12	
21	2	13,18,17	12	
20	3	16,17		
	4	16	17	
	5	11		
	6	9		
16	7	16		
15	8			
	9			
	VIOLA 1970			
	1			
	2			
	MALTONI 3			
	TOTAL	57	43	8

* Cholangiosarcoma

** Aerosol can filler

*** US33, 34 and 36; and F15 and 16 still alive

TABLE 4FLATENCY PERIOD OF ASL CASES TABULATED BY YEAR OF FIRST EXPOSURE
AND SPECIFIC PLANT

YEAR OF FIRST EXPOSURE	S CHARLESTON	LOUISVILLE	SHAWINIGAN	TROISDORF
1939	38			
1940				
1	37		21	
2	32,38			
3	32		14	
4	24,34,39	20	11,24	
5		28,29,27	22	
6	30,35		26,28	
7		29,28	24	
8		24		
9				
1950		19		
1				
2		15		
3			23	
4		28		21,25
5		14,19		23
6				12
7				13
8				
9				
1960				
1			12	16,16,19,18,
2		12		17

TABLE 4H

LATENCY PERIOD OF ASL CASES TABULATED BY YEAR OF FIRST EXPOSURE AND SPECIFIC PLANT

YEAR OF FIRST EXPOSURE	SUNDSVALL	BRIGNOUD	ST FONS	BARRY	BURGHAUSEN	NIAGARA	SPLIT
1939							
1940							
1			37, 41				
2							
3			38				
4							
5	27*						
6	31		29			15, 23	
7	29						
8			28, 34				
9		26, 30					
1950				31, 33			23*
1	19			28		17	
2							
3					25		20
4					21		22*
5			27		22	21	
6			21				
7					17		
8		18					20
9		16					
1960							
1							
2				18			
3				17			
4	16						
5		11					
6				9			

* Monomer workers

TABLE 6

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

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		US31	
	3	UK09, It5, F17	US35	
	Total	55 ***	40***	8

* Cholangiosarcoma

** Aerosol can filler

*** Does not include US33, 34 and 36; and F15 and 16. All still alive.

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, 15,16,17	46,48,56,41,43, 55,41,48
1940	United Kingdom	ICI	Runcorn		
1940	United Kingdom	ICI	Hillhouse	01,04	44,54
1945	Sweden	Kemnord	Sundsvall (Stockvik)	01,02,03,04,05	51,45,47,46,64
	Switzerland	Lonza	Sins		
1946	France	Rhone-Poulenc	Rousillon	01	46
1947	Italy	Montedison	Porto Marghera	02	57
1948	United Kingdom	BP Chem	Barry	03,05,06,07,08,09	66,51,62,63,50,50
	West Germany	Huls	Marl	09,10	61,61
1949	Belgium	Solvic	Jemeppe	01	58
1950	France	Ruk	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	Hernand		
	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	Caixa	Sabinanigo		
		Hispavic	Torrelavega		
1958	West Germany	Solvay	Rheinberg		
1960	Italy	S C Ravenna	Ravenna	04	59
1960	West Germany	Lonza	Waldshut	06,13	62,60
1962	Portugal	Cires	Oporto		
1963	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	Bediphill	Antwerp		
1969	United Kingdom	Vinatex	Staveley		
	Italy	Rumancia	Cagliari Sardinia		
1970	Italy	SIR	Porto Torres Sar		
	United Kingdom	ICI	Runcorn		
1971	Italy	S C Ravenna	Ravenna		
	Spain	Hispavic	Martorell		
	Sweden	Kemnord	Steringsund		
	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

**Pansac, Mira Verica, case not included. (It 05) due not knowing start up date of the Plant.

PJST80061400,3/WPX-2

UCC 087120

USA PVC PRODUCERS - START-UP DATES vs ASL CASES

START-UP YEAR	COMPANY NAME	LOCATION	ASL CASE NUMBER	YEAR OF 1st EXPOSURE
1972	Nat Starch	Mareadosia, Ill		
1973	Borden	Springfield		
	Robintech	Painesville, O (sold to Georgia Pacific who converted to polystyrene)		
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 or BFG before 1950

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

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	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	Hip	Pancevo		
1977	Rumania	State Comps	Rimnicu Vilcea		

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	Mendoza (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)		