

All papers sent to
BRL 12/31/81



CHEMICAL MANUFACTURERS ASSOCIATION

December 4, 1981

REC-1111

DEC 10 1981

TO: Vinyl Chloride Program Panel
SUBJECT: Up-date of Epidemiology Study

MEDICAL
DEPARTMENT

The Vinyl Chloride Program Panel meeting scheduled for December 16, 1981 has been cancelled due to the unavailability of several key supporters of the epidemiology study. A new meeting date is tentatively set for January 20, 1982.

In the interim I would appreciate a reaction (by phone or memorandum) to the present situation. There is also a new proposal to be considered that would split the present study into two parts corresponding to Phase I and Phase II of the present EHA study proposal. A separate contract agreement would be drawn up for each phase. The work product at the end of the first study would include: 1) updated study tapes, and 2) hard-copy summary of data on the tapes and an indication of the completeness of records. EHA would then develop a protocol for the second study and submit a bid for completion. At this point we would have the option of taking the study protocol to another contractor or continuing with EHA.

I look forward to hearing from you on this matter.

Re:

① Byington plan to attend the Jan 20 meeting. This time to the whole panel, not just Coordinators.

② We need to call or write Carol for our response to 2nd paragraph.

③ Consider if breaking the study down, that way will increase cost. Does someone feel it will lead to better results?

CRS/seh

Sincerely,

Carol Stack

Carol R. Stack, Ph.D.
Administrator
Vinyl Chloride Program

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 John York, Everberg
Dr D W Plester
Mr H R Jervis, Millbank
Mr Brian Hasler, Vinatex
Mr Peter Heron, BP
Mr R H Harde, BIP Vinyls
Dr J T Carter, BP
Mr T L Phillips, BP
Dr P Lewis, CIA
Dr J P Tassignon, Solvay
Mr J Jauvert, Chloa Chimie, Paris
Dr Renzo Mattiussi, Montedison
Mr P Lechaudé, 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, P & P Wilton
Dr F W Best, Everberg
Mr C Cella, Montepolimeri
Mr G Dupont, APME
Dr C Bishop, EMAS
Mr B Werner, EMAS
Dr R 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
Dr J Rety, Chloa Chimie, St Fons
Dr Aubrun, PCUK
Dr I A Friedel, Berufsgenossenschaft der chemischen
Industrie, Heidelberg
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Industrie, Nurnberg
Prof Dr Thiess, BASF
Dr D M Ferguson, ICI Americas
Mr A G Mash, ICI Americas
Dr Gary Ter Haar, Ethyl Corporation
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 Gosztony Jr, Tenneco Chemicals, Saddle Brook (NJ)
Dr Donald W Hillman, Diamond Shamrock
Dr G Kent Hatfield, Diamond Shamrock
Dr Pierre Bertazzi, Milan University
Dr Hans Popper, Mount Sinai Medical Centre

SEP 1 1981

~~JOE~~
RSH
~~BRL~~
WDH

my only copy.
Please do not hold
WDH

JS/MM/D-58
17 August 1981
PJXS79170920/WPX Wide 11

UHL 15646

PREFACE

ACKNOWLEDGEMENTS, SIGNIFICANT CHANGES AND COMMENTS

- 1 Thank you for your letters and continued interest in this compendium of ASL cases. Notification of new cases is trickling in and regrettably we have knowledge now of 91. Confirmation of cases in some instances seems to be taking a long time but one is still left speculating whether the ASL case rate peaked in 1975-8.
- 2 I am grateful to Dr P A Bertazzi of Milan University for his letter of 1 June 1981 giving details of the Italian ASL Case 04 (the third to occur in the VCM/PVC industry in Italy and first 1981 death to be notified). Case 04 started work at SC Ravenna in the first year of that plant's operation if my records are correct.
- 3 In his letter of 24 February 1981, Dr M N Johnson of BF Goodrich gave me further details of US Case 17. This ASL case was diagnosed in 1974. The deceased man's family were unwilling to permit a post mortem when he died in 1980.
- 4 Mr I A Friedel of BG Chemie, Heidelberg in his letter of 8 April 1981 to Dr F W Best of ICI Europa has informed us of German Cases 18 and 19 who died in 1979 and 1980. We are grateful to Mr Friedel for this information and for his detailed corrections to earlier data.
- 5 The paper by Dannaher, Tamburro & Yam in American Journal of Medicine Volume 70 Feb 1981 pages 279-287 seems to describe US Case 17 and also confirms it as a BFG Louisville case. Could Dr M N Johnson please corroborate this?
- 6 I have embodied the data on US30 given to me by Dr Gosztonyi of Tenneco first as the 6 February edition was being mailed. I enclosed an addendum dated 24 February which I hope you all received. In a further letter dated 10 March, Dr Gosztonyi said it was conceivable that in his years as a maintenance mechanic (1964-1970) Case 30 might possibly have had some high VCM exposures.
- 7 I have added Table 13 to remind us that there are at least 6 plants in South & Central America as old or older than the Lonza, Waldshut plant which is the "youngest" to have produced an ASL case. I have not had any data of serious illness attributable to VCM from Latin America. Is there any information available?

John Stafford
Division Manager
Health and Environment Protection
ICI Petrochemicals and Plastics Division
Bessemer Road
Welwyn Garden City
ENGLAND

JS/MM/17 August 1981

URL 15647

IMPERIAL CHEMICAL INDUSTRIES LIMITED
PLASTICS DIVISION

LIVER ANGIOSARCOMA CASES (REVIEW DATA - 17 AUGUST 1981)

Table Sequence

Belgium	1	ASL Case Numbers by year of Death (Table 6)	30
Canada	2-3		
Czechoslovakia	4	ASL Case Numbers by year of first exposure (Table 7)	31
France	5-7	Western Europe PVC Producers - Start-up Dates vs ASL Cases (Table 8)	32
Germany	8-12		
Italy	13	USA PVC Producers - Start-up Dates vs ASL Cases (Table 9)	33
Japan	14	Canadian PVC Producers - Start-up Dates vs ASL Cases (Table 10)	34
Norway	15		
Sweden	16	East European PVC Producers - Start-up Dates vs ASL Cases (Table 11)	35
UK	17-18	Japanese PVC Producers - Start-up Dates vs ASL Cases (Table 12)	36
USA	19-23		
Yugoslavia	24	South & Central American PVC Producers - Start-Up Dates (Table 13)	37
Incidence of Cases pa (Table 1)	25		
Distribution of Cases by Country (Table 2)	26		
Pattern of Cases by Factory (Table 3)	27		
Latency Periods (Table 4)	28		
Annual Geographical Incidence (Table 5)	29		

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LIVER Angiosarcoma Cases - (Review Date: 17 August 1981)

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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>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 autoclaves 1968-1972 exposed to 50-200 ppm 8 hrs per day in 25m 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) Hospitalised ind. & chemi- cal industry	Hepatic tests in Oct 1974 were normal. Retired Feb 1975 Hospitalised May 1976 Complete Clinical and career details were given in a paper by Hublet et al in Arch. Belg. Med. Soc., Hyg. Med. Trev. Med. Leg. 1977 pages 601-622

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LIVER Angiosarcoma Cases - (Review Date: 17 August 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

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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

URL 15650

* Paper by Dr P DELORME 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: 17 August 1981)

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

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[illegible]

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LIVER Angiosarcoma Cases - (Review Date: 17 August 1981)

UJRL 15652

[illegible]

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PLASTICS DIVISION

France
Sheet 1

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LIVER Angiosarcoma Cases - (Review Date: 17 August 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	Roussillon	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	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 polymerisation	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. Raty 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	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 1976 found ASL 3) Haemorrhage from ASL 4) Right Hepatectomy	Ref. P Couderc et al "Revue des hopitaux" 10 Septembre 1976 Previously had bone angiosarcoma Alao Pillichowski et al "La Nouvelle Presse Medicale" 17th July 1979 Page 2485

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IMPERIAL CHEMICAL INDUSTRIES LIMITED
PLASTICS DIVISION

France
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LIVER Angiosarcoma Cases - (Review Date: 17 August 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	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 septicemia Small liver lesion found after autopsy
08	B	01.04.34	Solvay	Tavaux	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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LIVER Angiosarcoma Cases - (Review Dates: 17 August 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 DEATH	HISTOLOGICAL CONFIRMATION	ESTIMATED EXPOSURE LEVEL	OCCUPATION	OTHER CAREER HIGHLIGHTS	OTHER COMMENTS	
France															
10	IVP	24.05.19	RP	1st Pons	00.12.56	10.01.78	58	21	21	11.01.78	Yes	High	Autoclave cleaner	110 yrs in mechanical engineering industry 11946-1956	Died of pulmonary embolism 5 days after surgery
11	L	15.02.12	RP	1st Pons	00.01.41	12.08.78	66	37	31	11.11.78	Yes	High	1941-1946 polymer- isation 1946-1972 general purpose worker 1946-1972 VCM synthesis (HCl & Acetylene) Foreman (agent in waiting) 1972 retired		
12		16.08.14	PCUK	Br-ignoud	09.02.49	00.05.79	59	06	27	23.06.79	Yes	High	Monomer production and polymer- isation operator		
13		19.01.31	Solvay	Tavaux	23.09.61	26.06.79	40	91	13	22.08.79			Autocleaner 12 yrs as cycle mechanic. Auto- operator 19 yrs, 111 all of 1977 due to sanitary ware manufacture varices. Surgical intervention 125.05.79 (right hepatectomy)		

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PLASTICS DIVISION

Germany
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LIVER Angiosarcoma Cases - (Review Date: 17 August 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>GERMANY</u>															
01		00.00.30	Dynamit	Trolsdorf	01.10.56	19.09.68	38	12	12	25.01.69	Yes (NIOSH)		Polyworker		
02		00.00.31	Dynamit	Trolsdorf	14.10.57	25.09.70	39	13	11	14.12.71	Yes (NIOSH)		Polyworker		
03		00.00.30	Dynamit	Rheinfel- 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- ization workers in NIOSH list of 11.3.77. 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	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 Cokel et al Virchows Arch A Path 1976 1372 p 195-203

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PLASTICS DIVISION

Germany
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LIVER Angiosarcoma Cases - (Review Date: 17 August 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 (NIOSH gives as Case 06)		00.00.36	Hoechst	Frankfurt	02.04.60	10.12.73	38	13	05	16.12.74	Yes (NIOSH)		BC 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- isation workers in NIOSH list of 11.3.77 and 1.78. I don't think this is a correct classification by NIOSH. The man may have been involved in VCM polymerisation in pilot plant or in main
06 (NIOSH gives 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	Dynanit	Troisdorf	19.07.54	06.04.75	58	21	22	25.12.75	Yes	†	Polyworker	?	

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Germany
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LIVER Angiosarcoma Cases - (Review Date: 17 August 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	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 1 yr		10/78 Confirmed Average exposure first 19 yrs 150 ppm, 10cc 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 19 yrs 150 ppm, 10cc 1000 ppm, Last yr av 175 ppm. CWH letter of 21.04.78
11 (NIOSH gives as Case 10)		00.00.29	Wacker	Burg- 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	Dynalut	Troisdorf	00.00.61	00.10.77	39	16	6	07.10.77	Yes	?	PVC Manu- facture Autoclave worker for 6 yrs		

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PLASTICS DIVISION

Germany
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LIVER Angiosarcoma Cases - (Review Date: 17 August 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		100.00.14	Lonza	Waldshut	00.00.60	08.04.78	64	18	14	19.06.78	Yes				17 W Best letter of (30th June (enclosing data) (from (Mr I A Friedel (of BG Chemie
14											Not an Angiosarcoma				17 W Best letter of (30th June (enclosing data) (from (I A Friedel of (BG Chemie (withdrawing (this case
15 (NIOSH gives this as Case 13)		100.00.29	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 (4 also cases (9, 13, 15, 16 (14 17 given in (NHW Report for (1978
16		100.00.23	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 (1973 given in (NHW Med Inap (Rep for 1978.
17 (NIOSH gives as Case 15)		100.00.37	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 (diseases (diagnosed (02-02-73. (Oesophageal (varices. (probably acro (osteolysis.

URL 15859

* At the NIOSH/OSHA/NIHNS 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 Europe data originating from Mr I A Friedel of BG Chemie who stated that case 13 was a confirmed ASL and case 14 was not an ASL. Case 14

IMPERIAL CHEMICAL INDUSTRIES LIMITED
PLASTICS DIVISION

Germany
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LIVER Angiosarcoma Cases - (Review Date: 17 August 1981)

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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>GERMANY</u>															
18		00.00.13	Hoechst	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	19 (Figure given by Mr Friedel) (presumably early diagnosis in 1974?)	18	22.2.80	Yes		Autoclave Worker		

URL 15660

IMPERIAL CHEMICAL INDUSTRIES LIMITED
PLASTICS DIVISION

LIVER Angiosarcoma Cases - (Review Date: 17 August 1981)

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

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 supple- mentary list)		15.06.34			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		13.11.29	Montedison	Porto Marghera	00.00.57	13.12.72	43	15	06	00.12.72	Yes		Polyworker		
03		14.03.20	Solvay	Ferrara?	00.01.53	10.07.75	55	22	21	10.07.75	Yes	High	Autoclanner 8 yrs Autoclave operator 12 yrs		*FOA et al papers at Dubrovnik suggest Ferrara?
04	BF	20.07.37	SC Ravenna	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 polymer- isation. Area Foreman in same Dept since 1975.		

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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			Pra-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 bad 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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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>NORWAY</u> 01	AN	23.12.15	Worsk Hydro	Heroys	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 APNR Mtg of 19 June 1978 Mr P Rangnes stated that AN had been a member of a start-up team. VCM & PVC 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
SWEDEN															
01	HU	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	IVCM production		Mr Sjoellin'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's 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	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	300 ppm	1944-7 VCM 1947-8 Drier 1948-61 Autoclave operator 1961-66 Drier		
03	BJW	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	Hillhouse	26.04.54	00.06.79	59	25	18	12.10.79	Yes	Medium- high	54-5 Digging 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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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	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 Chargehand 1964-70 Charging operator 1970-72 Drier operator		
06	CEP	1931	BP	Barry	1962	09.01.80	48/9	18	12	09.01.80			17 yrs Poly Floor Operator 5 yrs Crasser on Poly Floor		
07	RB	1920	BP	Barry	1963		60	17		13.06.80			Polycleaner 1963-5 Recovery 1965-1971		Death attributable to VCM Angiosarcoma incidental finding
															In their supplementary list NIOSH are still quoting Case 102 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 PVC

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LIVER Angiosarcoma Cases - (Review Date: 17 August 1981)

*UK system of dates
DAY - MONTH - YEAR

USA
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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	RPG	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	RPG	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	RPG	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	RPG	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	RPG	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	RPG	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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USA
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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 09	Raymond Gettle- Finger?	08.11.31	BPG	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 Bachman	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 Sesswell of MCA
13	Richard Edward Clendenin	01.12.21	NCC	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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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															
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 towards in Army and other service. 46-50 Army	Table 4 in Wagoner Testimony to US Senate Confirmed in M N Johnson ltr 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 Katol (plasticiser) 8 Carboset operation	Navy Tyre Store		Confirmed in M N Johnson ltr 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			Williamport 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 Hinkle	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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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	Is this BFG? Seems likely from A.J.M. paper of Feb 1981	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 Helle Lane of whom 8 had died by 26.1.76 Seems to fit case described by Dannaher Tomburro & Yan in Feb 1980 Am J Medicine Vol 70 p280
23		00.00.23	Great American Chemical Company	Fitchburg Mass.	08.09.58	06.04.73	50	15	14	06.04.73	Yes				
24	Charles Edward Moore	17.05.17	UCC	5 Charle- ston	1939	27.05.77	60	38	24? (NIOSH says 26)	27.05.77	Cholangio- sarcoma (R Kaminski 26/2/79)	Medium to high for 24 yrs	1941-65 non- solvent vinyl resin unit and dispersion vinyl resins unit first as fitter 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	R M 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 NIOSH will retain on register since this neoplasm may be associ- ated with ASL.
(25)															R M Wheeler letter of 20/2/79 and Rose Kaminski letters of 26/2/79 and 5/11/80

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

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USA
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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	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 operator to paste charging. 111 August 1965. Terminated employment Jan 1966		R Kaminski letter of 26/2/79 and Prof. Tamburro letter of 19/1/79
27	J L Forrest	11.05.16	UCC	S Charle- ston	01.07.41	30.11.78	62	37	20 (RIOSH 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 ltr of 4 Jan 1979 and Charleston Daily Mail 30.11.78 and R Kaminski 26/2/79
28		11.04.17	UCC	S Charle- ston	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 Charle- ston	00.05.42	00.03.80	72	38	16	01.03.80	Yes				R Kaminski letters of 19th June 1980 16 5th Nov 1980
30	WVH	22.07.22	Tenneco Chemicals	Flemington	11.06.64	30.12.80	58	16	15	30.12.80	Yes	6 - Unknown 9 - Minimal	Maintenance Mechanic 16 yrs Elsewhere 11 yrs Boiler house Operator 9 yrs		

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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*		VCM Production		*In his letter of 3 Oct 1978, Dr Spirtas of NIOSH changed the status of Case 02 to VCM production employee. Dr Spirtas also notified a new Case 03 also a VCM production worker
03		21.12.31	Jugo Vinil	Split	04.06.54	11.01.76	45	22	22	11.01.76	Yes*		VCM Production		
04		11.06.30			15.12.58	03.09.78	48	20	18	03.09.78	Yes				Rose Kaminaki Letter of 19th June 1980

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TABLE 1

Page 25

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	5
1980	6
1	1
Total	<u>91</u>

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- 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.

TABLE 2

Page 26

Distribution of ASL Cases by Country

USA	27 ***
Canada	10
W Germany	18 **
France	13
Sweden	4 ****
Yugoslavia	4 *****
Italy	3 *
UK	6
Czechoslovakia	2
Norway	1
Belgium	1
Japan	2
Total	<u>91</u>

* Omit It01 - atypical case of PVC bag extruder.

** Includes GE03 aerosol can filler.

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

**** Includes one monomer worker.

***** Includes two monomer workers.

i.e. North America	37	
Western Europe	46	47951 780
Rest of World	8	
Total	91	

TABLE 3

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Pattern of ASL Cases by Factory(a) W Europe

Of the 46 cases in W Europe, 36 have occurred in clusters at 10 factories. Of the 18 German cases, 15 have occurred in clusters at 4 factories.

	<u>ASL Cases</u>
Kemanord, Sundsvall	4
PCUK, Brignoud	5
Dynamit, Troisdorf	7
RP, St Fons	4
Wacker, Burghausen	4
CWH, Marl	2
ICI, Hillhouse	2
BP, Barry	4
Solvay, Tavaux	2
Lonza, Waldshut	2
	<u>36</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 37 cases in N America, 33 have occurred at four factories out of a total of 49 factories - in N America 41 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>

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NB: There are 29 pre 1962 PVC plants in N America; 8 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.

TABLE 4

Page 28

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	13	298	22.9 *
	Germany	18	326	18.1 *
	Italy	3	58	19.3
	Norway	1	22	22
	Sweden	4	106	26.5
	UK	6	125	20.8
		<u>46</u>	<u>953</u>	<u>20.7</u>
<u>N America</u>				
	US	27	650	24.1 *
	Canada	10	204	20.4 *
		<u>37</u>	<u>854</u>	<u>23.1</u>
<u>Rest of World</u>				
	Czechoslovakia	2	31	15.5
	Japan	2	39	19.5
	Yugoslavia	4	85	21.2
		<u>8</u>	<u>155</u>	<u>19.4</u>
<u>Summary</u>				
	W Europe	46	953	20.7
	N America	37	854	23.1
	Rest of World	8	155	19.4
		<u>91</u>	<u>1962</u>	<u>21.7</u>

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

TABLE 5

Page 29

Annual Incidence of ASL 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	5	-	-	5
1980	3	3	-	6
1	1	-	-	1
Total	46 *	37	8	91

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

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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	
	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,G18		
	1980	UK6, UK7,G19	US17, US29, US30	
	1	It4		
	Total	46	37	8

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* Cholangiosarcoma
** Aerosol Can Filler

TABLE 7

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

KEY EVENTS		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,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	C8	
	2	G6,UK6	US6	
	3	Fr13, UK7		
	4		US30	
	5	Fr5		
	6	UK3		
	7			
	8			
	9			
Viola	70			
	1			
	2			
Maltoni	3			
	Total	46	37	8

* Cholangiosarcoma

** Aerosol Can Filler

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TABLE 3

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
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	BLP	Aycliffe		
	West Germany	Hoechst	Gendorf	18	55
1954	West Germany	Dynamit	Troisdorf	01,02,08,12,16, 17, 19	56,57,54,61,55, 61, 54
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	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	Flitchburg	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		

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* 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 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		

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

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TABLE 13

SOUTH & 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 Viplastic	Capitan Bermudez (Argentina) Mendoz (Argentina)		
1961	Indupa	Cinco Saltos (Argentina)		
1965	SOC Paramanga PET Columbiana	Paramonga (Peru) Cartagena (Colombia)		
1966	Carburo De Col	Medellin (Colombia)		
1967	Plasticos Omega	Mexico		
1968	Primex	Puebla (Mexico)		
1970	Policasa Petro Dow	Managua (Nicaragua) 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 Polychem Policyd	Cubato (Brazil) El Salvador Coatzacoalcos (Mexico)		
1979	PET Camacari	Camacari Bahia (Brazil)		

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