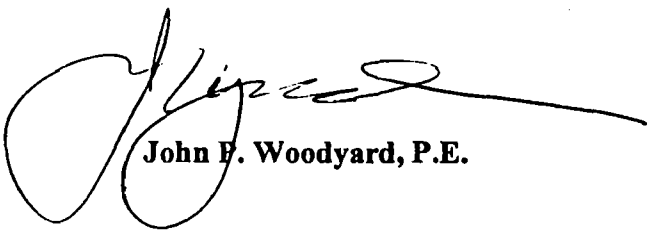
REPORT OF JOHN P. WOODYARD, P.E.

Transportation & Safety (T&S) Building
Expert Report



John P. Woodyard, P.E.

1.0 INTRODUCTION AND SUMMARY

My name is John P. Woodyard. I have been retained to review the results of the fire and subsequent remedial activities at the State of Pennsylvania Transportation and Safety Building in Harrisburg, Pennsylvania and to offer my opinions. In general, they can be summarized as follows:

- The PCB concentrations found in the T&S Building requiring cleanup were largely spread by the 1994 fire and should have been treated as a fire loss.
- Despite paying consultants over $15 million, virtually no cleanup was undertaken or accomplished.
- PCB concentrations found in the asbestos fireproofing were present at the time of application and did not result from "off-gassing" from the fiberglass ductwork, except for soot deposits from the fire and any PCBs it may have contained.
- PCBs used in the manufacture of the ductwork and light ballasts did not contribute to building PCB concentrations except when damaged by the fire.
- PCBs contained in the exterior caulk did not contribute to interior concentrations in the building.
- The appropriate cleanup standard for surfaces in the building was either 10 ug/100 cm^2 according to the EPA spill cleanup policy, or a level determined by a risk assessment.
- The fire did not result in significant formation of PCB combustion by-products, and as such was misrepresented to EPA as a "PCB fire." The ensuing involvement of NIOSH in a routine PCB spill cleanup was unnecessary. Average PCB

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concentrations on the non-fire floors were below the applicable EPA cleanup standards, and likely would have required minimal cleaning.

- Cleanup of the entire building could have been completed in as little as 12 weeks if the state had engaged experienced professionals.

- Cleanup and remediation of floors 4 through 7 could and should have been accomplished in the same 12-week period.

- The state's abuse of its own procurement process on this project prevented the engagement of the right consultant/contractor support, delayed completion of the project, wasted millions of dollars in sampling and monitoring time and caused the spreading of PCBs within the building.

- Failure of the state to avail itself of the Mega-rule cost them millions of dollars in unnecessary cleaning and disposal costs.

- PCB remediation was unnecessary on many of the occupied floors, which also wasted millions of dollars more.

- Asbestos abatement of the entire building for sprinkler installation after the fire should have cost no more than about $13.3 million. Additional costs incurred as a result of the low PCB concentration levels in the asbestos would have been negligible, approximately $100,000.

- The use of Kimball for the furniture sampling program was unnecessary; contents characterization should have been part of the initial building characterization and was therefore a duplication of effort.

- The PennDOT contents strategy resulted in unnecessary cleaning, resampling, replacement, and disposal costs, costing millions of dollars more.

The basis for these opinions is presented on the following pages.

2.0 STATE DEVIATIONS FROM STANDARD PRACTICE IN PCB SPILL/FIRE CLEANUP

Since the disposal of PCBs was first regulated in 1978, numerous PCB spills have occurred and subsequently been cleaned up, many of which have occurred in office buildings.

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While the specific remedial approach varies among incidents based on location, scale, and human health/environmental exposure potential, the approach taken typically includes these following steps:

- Containment.
- Characterization.
- Gross Cleanup.
- Decontamination.
- Confirmatory sampling.
- Closure documentation.

Over time, EPA has provided guidance to responders regarding such elements as confirmatory sampling protocols and analytical screening tools, but the basic approach is left to the owner and their consultants/contractors to implement based on their professional experience.

In all spill situations I have been involved in, the owner aggressively moved to contain and characterize the site, remove any highly contaminated material from the site, and then proceeded with cleanup and decontamination at a pace consistent with both the potential health risk and economic factors associated with the project.

Reviewing the documents associated with the Transportation and Safety (T&S) Building incident and associated response, I concluded that this project is unique in its lack of progress toward remediation. Contributing causes are many, including:

- The lack of consultant/contractor experience with projects of a similar nature and scale.
- Confusion over who was in charge of the project and responsible for setting milestones.
- Perpetuation of the inexperience problem that was flawed with a procurement process that made less likely the introduction of the proper expertise.
- Failure to analyze and present the massive amounts of data being collected into a coherent summary suitable for making decisions and scoping the remedial effort.

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The end result was a seemingly endless monitoring project that wasted millions of dollars and years of building use.

Using my specific knowledge of similar building cleanups performed elsewhere and general principles applied to such projects, I prepared the schedule chart shown in Figure 1 to illustrate how the project should have proceeded once PCB contamination was discovered and competent technical support was engaged. Each of these work elements is described below. In addition, this typical approach is contrasted with the State of Pennsylvania's atypical, indeed unique project organization and decision process, which can be characterized as ad hoc and lacking leadership. These differences are largely responsible for the waste of millions of dollars.

Initial Assessment. Once the possibility of a PCB release was determined on the first day, the owner should have mobilized their emergency response contractor to secure the site. An initial screening effort should have begun to determine if/where the soot deposits contained PCB and at what level (if any), and the analytical results provided on a rapid turnaround basis. The results would have shown occasional PCB concentrations in the soot.

The building would have been closed temporarily at that point. The owner would then have either reaffirmed their contractor's capability to assess and clean up PCBs or initiated efforts to find a specialist to guide them. The specialist(s), either a consultant/project manager or remedial contractor, would have then:

- Helped the owner determine if the spill was reportable.
- Suggested what the applicable standards might be for cleanup.
- Identified the possibility of PCB combustion by-product formation (furan in this case) and encouraged sampling of same.
- Proposed any additional sampling.
- Helped establish a health and safety plan and protocols consistent with standard practice for similar incidents.

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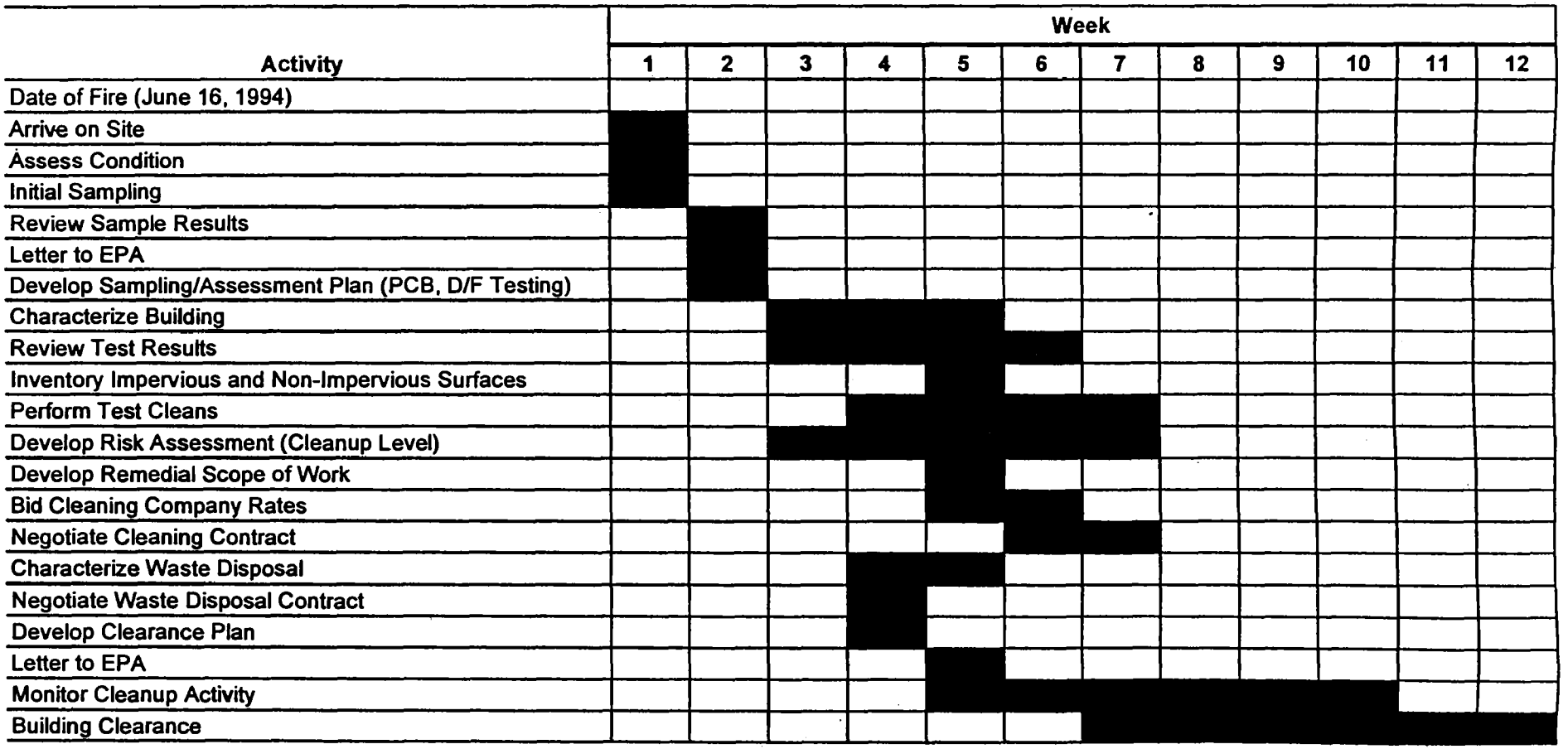
Figure 1

Schedule of Decontamination and Reoccupancy at T&S Building Following PCB Release*



* Work activities, scope and duration are based on similar experience with other commercial projects.

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- Helped their client develop a formal plan of attack, suitable for presentation to EPA.

The process followed at the T&S building bore little relationship to the above, despite the existence of numerous publications and a wealth of documented technical experience from similar projects performed over the preceding 20 years.

Detailed Assessment and Initial Cleanup

Working with it's insurance carrier, the building owner would have contacted and screened national firms with expertise in PCB spill and fire cleanup for their interest and availability, including specific requests for their approach, rates for personnel and equipment, resumes for key personnel, references, and examples of similar projects performed. The owner:

- Might choose to have the contractor managed by a consultant.
- Could ask for either lump sum, unit rates, or hourly labor and material charges depending on how well the extent of contamination is known.
- Require bonding and/or stipulate liquidated damages to cover cost and schedule risk.

The remedial contractor would then begin implementing their cleaning efforts, usually on a fast track basis, focusing first on removing soot using vacuuming and cleaning agents. Sampling proceeds (often by a consultant independent from the contractor) as areas are cleaned, and those areas that pass the clean criteria are isolated to prevent cross contamination (most of the sampling on such projects occurs during the cleaning phase rather than the assessment phase). Waste removed during the cleanup is managed according to a plan, using either the contractor's disposal contract or a direct contract with the owner.

A sampling strategy would be developed and implemented at this point, further identifying the extent of residual contamination. Clean areas not impacted by the incident would be isolated to prevent cross-contamination, heavily contaminated damaged items would be removed and other

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contents sampled systematically to establish zones of contamination, and soot removal would continue.

The results of detailed characterization would be plotted, the extent of remaining contamination defined, and the scope of additional cleanup (if necessary) clearly delineated. Test cleaning of selected surfaces might be attempted at this point for selected materials, although the cleaning agents available and commonly used for PCB decontamination are well known through field experience and technical literature.

In contrast, at the T&S building the closest thing to a detailed characterization was the Cocciardi daily sample collection program, which consisted of essentially a quota of wipe and air samples, with minimal direction as to where the samples should be located and how they fit into an overall remediation plan. These samples were eventually logged in a data base, with their apparent primary purpose being to determine (after the fact) whether building occupants had already been exposed to PCBs. None of the data was plotted on building floor plans to show areas of contamination, a standard practice for such projects. No attempt was made to delineate areas of contamination for possible remediation until Gannett Fleming was hired in 1996, at which time the sampling data collected during the first 2.5 years was essentially ignored.

Wipe and bulk samples, the primary tools used to define the extent of contamination for purposes of remediation, were substantially reduced in number at the end of 1994 (6 months after the fire). This would normally be a good indication that enough data had been collected to define the problem and begin remediation, but in this case it marked the beginning of another 2 years of inactivity and lack of progress.

The accumulation and storage of waste on the 6th floor for over 2 years cannot be explained, but resulted in more wasted money for fire watches. Similarly, the test cleaning data from 1995 showed clearly that dust was being resuspended freely when the 6th floor was entered, which to an experienced professional would have signaled the need to at least vacuum the floor to avoid spreading the contamination and increasing airborne levels on the fire floors. Rather than progressively cleaning and isolating areas, the state chose to allow Cocciardi to continue serving

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more as a "sentinel" than cleanup consultant. This strategy served only to waste money while allowing the contamination to be more evenly distributed on floors 4 through 7.

Building Clearance. A "closure plan" is usually developed for projects like this, which simply provides a sampling plan to be used to confirm that cleaning was successful. The sampling strategy is often statistical in nature, using a grid scheme and/or random number generator to identify sample locations. The plan may also allow for sequential release of areas within the building (such as individual floors), provided cross-contamination can be prevented. Once the cleanup is thought to be complete, the results of the confirmatory sampling are often presented to EPA, and later documented in a project report.

No such plan was even suggested throughout the sampling program. On the contrary, the few attempts to make sense of data (for the building contents, for example) were not based on a sampling design at all, but rather generated statistical information that led to no definitive conclusion.

3.0 MISUSE OF THE SITE CHARACTERIZATION RESULTS

3.1 Data Base Mismanagement and Misuse

The PCB and asbestos test results were collected in an electronic database, presumably for ease of sorting and examination. There is no evidence, however, that the data were ever used for anything except a snapshot of contamination at a certain location at a certain time.

Interestingly, much of the data necessary for site characterization and remedial planning existed by the end of 1994 but was never used for this purpose. The wipe sample data showed that much of the building was already clean enough for re-occupancy, and also identified those floors and areas where additional characterization and/or cleaning might have been appropriate. Using that same database, Tables 1 and 2 were generated to summarize the high and low contact results, respectively, by floor. Using the EPA's corresponding 10 and 100 ug/100 cm^2 criteria for cleanup, the data shows that most of the occupied floors were already clean. All of the occupied floors already met the risk-based cleanup standard of 19.8 ug/100 cm^2.

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Table 1
Summary of Wipe Samples and Percent Total by Floor
Low Contact Areas

Floor	Concentration Level (ug/wipe)	No. of Samples	Average	% of Floor Total
01				
	< 10	49	3.21	82
	< 20	7	13.6	93
	< 50	3	27.83	98
	< 100	1	56.1	100
	> 100	0	0	0
TOTAL		**60**		
02				
	< 10	46	2.41	87
	< 20	4	13.08	94
	< 50	3	38.7	100
	< 100	0	0	100
	> 100	0	0	0
TOTAL		**53**		
03				
	< 10	49	3.65	82
	< 20	7	13.62	93
	< 50	3	31.73	98
	< 100	1	71	100
	> 100	0	0	0
TOTAL		**60**		
04				
	< 10	54	3.21	89
	< 20	2	13.05	92
	< 50	3	37.17	97
	< 100	2	76.35	100
	> 100	0	0	0
TOTAL		**61**		
05				
	< 10	54	3.85	89
	< 20	4	14.08	95
	< 50	1	28.8	97
	< 100	0	0	0
	> 100	2	116.1	100
TOTAL		**61**		
06				
	< 10	260	1.08	90
	< 20	12	13.9	94
	< 50	6	29.07	97
	< 100	2	83	97
	> 100	8	184.73	100
TOTAL		**288**		

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Table 1
Summary of Wipe Samples and Percent Total by Floor
Low Contact Areas

Floor	Concentration Level (ug/wipe)	No. of Samples	Average	% of Floor Total
07				
	< 10	44	4.91	83
	< 20	6	13.32	94
	< 50	0	0	94
	< 100	2	35.65	98
	> 100	1	176.7	100
TOTAL		**53**		
08				
	< 10	48	3.93	87
	< 20	2	12.25	91
	< 50	3	25.3	96
	< 100	1	89	98
	> 100	1	106.6	100
TOTAL		**55**		
09				
	< 10	61	2.84	86
	< 20	6	14.28	94
	< 50	2	24.2	97
	< 100	1	72.1	99
	> 100	1	103.7	100
TOTAL		**71**		
10				
	< 10	49	3.46	84
	< 20	3	14	90
	< 50	3	38.63	95
	< 100	3	70.4	100
	> 100	0	0	0
TOTAL		**58**		
11				
	< 10	47	3.43	80
	< 20	6	16.28	90
	< 50	3	34.4	95
	< 100	1	80.3	97
	> 100	2	153.05	100
TOTAL		**59**		
12				
	< 10	45	3.38	87
	< 20	3	12.5	92
	< 50	1	25.9	94
	< 100	2	66.7	98
	> 100	1	111.8	100
TOTAL		**52**		

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Table 1
Summary of Wipe Samples and Percent Total by Floor
Low Contact Areas

Floor	Concentration Level (ug/wipe)	No. of Samples	Average	% of Floor Total
13				
	< 10	45	3.9	71
	< 20	10	12.47	87
	< 50	4	26.4	94
	< 100	2	69.05	97
	> 100	2	254.15	100
TOTAL		**63**		
14				
	< 10	41	4.2	73
	< 20	11	13.51	93
	< 50	4	33.2	100
	< 100	0	0	100
	> 100	0	0	0
TOTAL		**56**		
15				
	< 10	7	4.94	70
	< 20	3	11.97	100
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**10**		
B				
	< 10	0	0	0
	< 20	0	0	0
	< 50	1	24	50
	< 100	0	0	0
	> 100	1	123	100
TOTAL		**2**		
ELE				
	< 10	31	2.75	72
	< 20	7	12.41	88
	< 50	4	27.48	98
	< 100	0	0	98
	> 100	1	102	100
TOTAL		**43**		
ES				
	< 10	11	6.42	38
	< 20	10	12.55	72
	< 50	8	26.73	100
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**29**		

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Table 1
Summary of Wipe Samples and Percent Total by Floor
Low Contact Areas

Floor	Concentration Level (ug/wipe)	No. of Samples	Average	% of Floor Total
FB				
	< 10	175	0	0
	< 20	0	0	0
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**175**		
LB				
	< 10	171	0	0
	< 20	0	0	0
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**171**		
MR				
	< 10	32	1.93	94
	< 20	2	11.4	100
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**34**		
NA				
	< 10	64	0.02	100
	< 20	0	0	0
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**64**		
PAED				
	< 10	1	8.6	50
	< 20	0	0	0
	< 50	1	32	100
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**2**		
Penthouse A				
	< 10	1	0	100
	< 20	0	0	0
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**1**		

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Table 1
Summary of Wipe Samples and Percent Total by Floor
Low Contact Areas

Floor	Concentration Level (ug/wipe)	No. of Samples	Average	% of Floor Total
Penthouse B				
	< 10	3	0	100
	< 20	0	0	0
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**3**		
PH				
	< 10	15	2.8	58
	< 20	6	13.42	81
	< 50	3	25.47	92
	< 100	1	91.5	96
	> 100	1	107	100
TOTAL		**26**		
SS				
	< 10	18	6.03	44
	< 20	11	14.43	71
	< 50	10	32.29	95
	< 100	2	77.5	100
	> 100	0	0	0
TOTAL		**41**		
TR				
	< 10	5	0	100
	< 20	0	0	0
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**5**		
Unknown				
	< 10	5	5.39	42
	< 20	1	8.4	50
	< 50	2	38.9	67
	< 100	3	73.03	92
	> 100	1	124.5	100
TOTAL		**12**		
WS				
	< 10	13	6.79	46
	< 20	11	14.45	86
	< 50	4	29.88	100
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**28**		

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Table 1
Summary of Wipe Samples and Percent Total by Floor
Low Contact Areas

Floor	Concentration Level (ug/wipe)	No. of Samples	Average	% of Floor Total
Blank				
	< 10	136	0	100
	< 20	0	0	0
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**136**		
GRAND TOTAL		**1,259**		

Table 2
Summary of Wipe Samples and Percent Total by Floor
High Contact Areas

Floor	Concentration Level (ug/wipe)	No. of Samples	Average	% of Floor Total
01				
	< 10	19	1.26	95
	< 20	1	15.1	100
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**20**		
02				
	< 10	20	2.51	100
	< 20	0	0	0
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**20**		
03				
	< 10	45	0.57	100
	< 20	0	0	0
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**45**		
04				
	< 10	17	2.34	94
	< 20	1	11.9	100
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**18**		
05				
	< 10	22	2.75	92
	< 20	2	13.7	100
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**24**		
06				
	< 10	375	1.33	82
	< 20	40	14.26	91
	< 50	17	31.73	94
	< 100	9	77.07	96
	> 100	17	5,758.24	100
TOTAL		**458**		
07				
	< 10	14	1.67	78
	< 20	3	12.8	94
	< 50	1	30	100
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**18**		

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Table 2
Summary of Wipe Samples and Percent Total by Floor
High Contact Areas

Floor	Concentration Level (ug/wipe)	No. of Samples	Average	% of Floor Total
08				
	< 10	21	1.09	100
	< 20	0	0	0
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**21**		
09				
	< 10	20	1.52	100
	< 20	0	0	0
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**20**		
10				
	< 10	19	1.68	95
	< 20	1	12.5	100
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**20**		
11				
	< 10	36	2.29	77
	< 20	9	13.99	96
	< 50	0	0	96
	< 100	2	24.75	100
	> 100	0	0	0
TOTAL		**47**		
12				
	< 10	21	0.89	100
	< 20	0	0	0
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**21**		
13				
	< 10	13	3.14	59
	< 20	7	15.41	91
	< 50	0	0	91
	< 100	2	23.55	100
	> 100	0	0	0
TOTAL		**22**		
14				
	< 10	76	1.55	97
	< 20	2	10.45	100
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**78**		

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Table 2
Summary of Wipe Samples and Percent Total by Floor
High Contact Areas

Floor	Concentration Level (ug/wipe)	No. of Samples	Average	% of Floor Total
ELE				
	< 10	17	0.63	100
	< 20	0	0	0
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**17**		
FB				
	< 10	1	0	100
	< 20	0	0	0
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**1**		
FE				
	< 10	5	0	100
	< 20	0	0	0
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**5**		
Penthouse A				
	< 10	2	0	100
	< 20	0	0	0
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**2**		
Unknown				
	< 10	1	1.6	50
	< 20	1	20.9	100
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**2**		
Blank				
	< 10	3	0	100
	< 20	0	0	0
	< 50	0	0	0
	< 100	0	0	0
	> 100	0	0	0
TOTAL		**3**		
GRAND TOTAL		**855**		

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The Cocciardi air data from HVAC filters and the progressive changes in air exchange rates from 100% to 50% showed that the HVAC system was not a vehicle for contaminant redistribution. With the lack of redeposition potential, the early wipe sample data still represented enough information to make remedial decisions at any time during the first few weeks after the fire. Failure to act on this information almost certainly aggravated the problem, allowing contaminants to be moved around through tracking and airborne redeposition into otherwise clean areas.

Surface and bulk sampling for PCBs did not recommence in earnest until 1996, when Gannett Fleming began their remedial engineering. The results more than two years later showed no significant change in the levels of contamination between 1994 and 1997.

3.2 Other Critical Data Analyses That Were Never Performed

A review of the data available to the state and their consultants in 1994 revealed a number of facts that have not been noted in their experts' reports in this case. The analysis of air sampling results is a good example: from Table 3, a total of 3,787 air samples were collected, of which 3,338 showed no detectable PCBs. Of those with measurable PCBs, 418 showed only Aroclor 1242. More importantly, only 18 samples (<1%) showed only Aroclor 1260 (1262), 15 of which were taken on the 6th floor where PCBs were liberated by the fire. When analyzed in this light, the data clearly contradict the state's contention that PCBs in the ductboard adhesive vaporized throughout the life of the building.

3.3 The Role of Risk Assessment

One of the options suggested by EPA early on was the possibility of using risk assessment as an alternative to simply accepting the generic cleanup standards offered in the PCB Spill Cleanup Policy. The state never attempted a formal risk assessment (normally a $10-20,000 exercise), choosing instead to adopt the NIOSH guidelines, which themselves are not risk-based.

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Table 3

Summary of Air Sample Results by Floor and Aroclor

Floor	Total No. of Samples	1242	% of 1242	1260	% of 1260	1242/1260	% of 1242/1260
01	3787	5	0.13				
02		10	0.26				
03		10	0.26				
04		3	0.08				
05		2	0.05				
06		318	8.40	15	0.40	11	0.29
08		8	0.21				
09		7	0.18				
10		12	0.32				
11		34	0.90	2	0.05	2	0.05
12		4	0.11				
13		1	0.03				
14		1	0.03				
FB		1	0.03				
LB		2	0.05				
PH				1	0.03		
Total No. of Samples		418		18		13	

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3.3.1 Results of Risk Assessment. A risk assessment has been performed, which showed a cleanup standard of about 19.8 ug/100 cm^2 would have been appropriate for the T&S building using a long-term exposure scenario. Based on this standard, virtually no cleanup of the building would have been required. Even if the state had elected to use published standards , the absence of evidence of a PCB fire would have allowed the EPA Spill Cleanup Policy standards to be used anyway.

3.3.2 Typical Past Practices. Most significant PCB spills in occupied buildings, whether offices or industrial facilities, have included a risk assessment to complement the selection of EPA's spill policy standards. The purpose of the risk assessment (sometimes referred to as an exposure assessment when conducted indoors) is to reconfirm the validity of the generic EPA standard for a particular situation, and to refine the assessment to reflect different occupancy duration or facility life expectancies for the building in question.

The state's intent to abate the asbestos and install sprinklers by 1995 (as was announced by DGS before PCBs were detected) provided an opportunity to adjust the standards to reflect this reduced exposure for employees. Indeed, the state repeatedly reassured the state employees occupying the building, through press releases and newsletters, that the remaining levels were "safe." Physicians hired by the state even evaluated the blood test results from building occupants and declared that there was no risk to their health from exposure.

4.0 HISTORICAL COMPARISON WITH SIMILAR CLEANUPS

Many PCB spills have been cleaned up since the TSCA regulations were first promulgated. The advent of the PCB Spill Cleanup Policy in 1987 further simplified the cleanup process by setting standards for different types and sizes of spills, and has served as a presumption against EPA enforcement if followed.

Historically, NIOSH has only been consulted if (a) a PCB fire is known to have occurred (particularly in government facilities) and (b) when a labor union or other employee organization has requested help when the owner wouldn't take action on his own. Most of the employee

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requests occurred before the EPA spill policy was published. NIOSH responses to PCB fires are always memorialized in a report such as the response provided to DGS; because the T&S incident was not a PCB fire but rather an airborne spill, the NIOSH response explicitly directed the state to the EPA Spill Cleanup Policy.

4.1 The T&S Fire Should Never Have Been Characterized As a "PCB Fire"

The pyrolysis (incomplete combustion) of PCBs is known under special temperature, exposure time, and oxygen conditions to produce polychlorinated dibenzofurans (PCDFs), which are considered by EPA to be more toxic than PCBs. Several high-profile incidents of PCDF formation in commercial office building and industrial PCB fires are documented, particularly since 1981. PCDFs were detected at low levels in the T&S building, and their formation and distribution was clearly the result of the fire.

The T&S building was characterized incorrectly as a "dioxin" incident, however, where polychlorinated benzo-p-dioxins were allegedly formed from the combustion of PCBs. In fact, research has clearly shown that dioxin compounds cannot be formed from PCBs. Dioxins can be formed under pyrolytic conditions from certain chlorobenzene compounds, such as those used in electrical transformers. These compounds, however, are not present in any of the suspected PCB sources in the T&S building, including the light ballasts. Interestingly, however, dioxin compounds were detected in the building anyway, clearly from a non-PCB source.

Dioxins and furans are often associated with other types of non-PCB fires. T&S building data showed in some cases that only octachlorodioxin was detected; the "octa" compound has been found to exist in many environmental situations as the result of other fire sources, and represents little or no risk to human health based on the weighting given it in the equivalency standards. If the dioxin results prove anything, it is that fire damage in the form of soot was still present and should have been addressed as part of the insured fire response.

In short, NIOSH should not have been consulted for PCB fire advice because a PCB fire in the technical sense did not occur. Their opinion about PCB cleanup, which is hardly ever solicited, is

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not risk-based but based on the assumption that any exposure is harmful. They have since changed their view to endorse risk-based standards.

4.2 Cleanup Cost and Schedule Would Have Been Significantly Better if Undertaken Promptly

The governing authority of U.S. EPA and the Toxic Substance Control Act (TSCA) regulations over the T&S PCB releases was acknowledged by DGS and its contractors. Nonetheless, the state and its contractors sought guidance from the National Institute for Occupational Safety and Health (NIOSH), which was typically involved more in PCB fires where furans and dioxins were an issue (they were quickly shown to be a non-issue at T&S) and had no regulatory or standard-setting authority over this project.

U.S. EPA was not formally engaged in the project for their input into this project until 1995, despite being the lead agency for this project, long after the fire, and after millions of dollars had been spent on monitoring and the "characterization" using wipe samples had essentially been completed. Cocciardi appointed himself the "lead negotiator" for the project despite never having worked on a similar project nor dealt with EPA in this capacity. It is unusual for an owner to appoint a consultant or even an attorney as a lead technical negotiator, even if they have experience. It was even more surprising in light of his lack of credentials; other such panels (convened only for PCB fires, which did not occur here), were chaired and staffed by credentialed professionals in toxicology and other related disciplines.

As a result of this misdirection, the state did not bring to the EPA scientifically grounded risk-based solutions, but rather passively requested EPA direction. From the direction given by EPA, it is clear the state mischaracterized the incident as a "PCB fire" involving dioxin formation. Had the state hired an experienced contractor, the fire would not have been mischaracterized, and NIOSH guidance would not have been solicited at all.

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4.3 The Mega-rule Impacts Proposed During the T&S Building Project Provided Significant Financial Benefits to the Remediation Effort

In 1991, U.S. EPA published an Advance Notice of Proposed Rulemaking announcing their intent to revamp much of the PCB rules, including providing disposal relief for certain large volume PCB wastes such as soil and demolition debris. Indeed, during the early stages of the T&S building study (December 1994), U.S. EPA published a proposed rule that authorized the management of low concentration PCB waste such as demolition debris (with PCB containing paint, caulk, ductwork and other building products, for example) as unregulated under TSCA.

Knowing this, the State and their inexperienced contractors elected to proceed with plans for the demolition of the T&S building. The final regulations were promulgated in June 1998 and became effective in August 1998, the same month the T&S building was demolished. The cost savings that would have resulted form the new rules would have been more than $1.7 million. The state could have attempted to negotiate a compromise once the rules were proposed (the portion of the rule providing relief from the disposal requirements for demolition debris did not change significantly from proposal to final rule), but never seriously tried.

To illustrate, the actual cost of waste disposal from the pre-demolition cleanup is compared in Table 4 with the probable cost if the new rules were used as the basis for disposal decisions . Clearly, abating the building under the Mega-rule would have saved the state a significant sum of money in disposal alone, even considering that much of the money spent was on fire damage that they would not normally be responsible for.

5.0 MILLIONS OF DOLLARS WAS WASTED ON THE T&S BUILDING CLEANUP

PCB remediation costs consist of the following:

- Site characterization.
- Site cleanup.
- Waste disposal.
- Loss of access during the cleanup.

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Table 4

Potential T&S Remediation Cost Savings for Disposal Resulting from PCB Mega-Rule

Material	Waste, Tons [2]	TSCA Disposal [3] ($K)	Mega-Rule Cost [4] ($K)	Difference ($K)
Lights	233	58	7	51
Caulk	635	159	19	140
Computer	175	44	5	39
Fireproofing	977	244	29	215
Ductboard	101	25	3	22
Mixed Debris	223	56	7	49
Unoccupied Floor Debris [1]	1,715	429	429[1]	0
TOTAL	4,059	1,015	499	516

[1] TSCA disposal assumed for all cases.

[2] From Gannett Fleming.

[3] Assumed $250/ton.

[4] Assumed $30/ton.

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5.1 PCB Cleanup Assuming Re-occupancy

Realistically, based on the approach outlined earlier, the following approximate costs would have been incurred during the 12-week characterization and remediation period:

- Project management, site characterization, testing, analysis, and health and safety: $0.43 million.
- Disposal of waste from unoccupied floors as TSCA-regulated, and the remainder as demolition waste: $0.53 million.
- Gross decontamination of soot and visible fire damage: $3 million, including allowance for proper worker protection.
- Fine decontamination/recleaning of no more than 5% of the building: $0.15 million.

The total cost should therefore have been closer to $4 million, all attributable to the fire. The difference between this estimate and the actual costs incurred by the state is a direct result of the lack of DGS initiative in directing the project toward some logical conclusion (e.g. remediation and clearance), their poor judgement in attempting almost immediate re-occupancy of the building, and their insistence upon continuing to retain Cocciardi despite the firms' demonstrated lack of experience with cleanups of a similar type and scale.

If the building were being cleaned for re-occupancy and sprinklers were being installed, the cost for asbestos abatement would have been about $13.3 million for asbestos removal and replacement of fireproofing plus collateral repair/replacement of ceiling tile, duct, and lighting.

5.2 PCB Cleanup Assuming Demolition

The actual cost of the PCB portion of the cleanup can be determined from examining the results of Gannett Fleming's work and PDG's bid. Adding PCB remediation to the asbestos abatement bid resulted in inclusion of the following incremental cost components:

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- PCB-containing waste disposal at a TSCA landfill.
- Additional protection (level B).
- PCB decontamination of all floors.
- Caulk removal.

Waste disposal. Approximately 2,342 tons of material were disposed of as TSCA waste from the non-fire floors. Ignoring the bid prices, assume $250/ton for TSCA transportation and disposal, or an incremental cost of $585,500. Approximately 1,838 tons of waste were generated from floors 4-7, at an estimated cost of $459,500. The combined total was $1,045,000. In reality, the occupied floor waste could have gone to a non-TSCA landfill at a cost of about $30/ton, or a total cost of $70,260, a savings of $515,240.

PCB Decontamination. The PDG payment schedule showed a total PCB decon cost of $868,000 excluding the caulk work. Approximately 75% of this would have been associated with floors 4-7.

Additional Protection. The contractors working in the building were required to use level B worker protection for the month of January, 1998, after which protection was downgraded to level C. The additional cost of this unnecessary protection was about $100,000, which does not include the cost of lost productivity during abatement and cleaning work.

Caulk Removal. The approximate cost of exterior caulk removal was about $1 million based on the payment schedule, which would not have been required under the Mega-rule.

Net Cost. Most of the labor, worker protection and waste disposal costs are associated with asbestos abatement. If the building were being demolished, the asbestos abatement would have included removal of fireproofing, pipe insulation, ceiling tiles and ductwork, for a total of about $13.3 million including bonding, insurance, design, and oversight. The actual bid from PDG for comparable work (plus PCB removal) was about $12 million.

Adherence to the Mega-rule changes would have eliminated the need for separation and regulated disposal of building materials such as caulk and ductwork, disposal of the ductwork

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would have been required as part of the asbestos abatement effort anyway, and disposal of any PCB-containing light fixtures could have been performed under existing and new rules as municipal solid waste. The only remaining PCB waste would have been material damaged by the fire, an insured loss (if the state had bothered to file the appropriate claim and applied the loss proceeds to the cleanup).

Based on the above, the cost of PCB-related work on the PDG project was about $1 million for caulk, $600,000 for decon, and $1 million for disposal, or a total of $2.6 million. Of that $2.6 million, the caulk removal, non-fire floor TSCA waste disposal, and Level B protection were unnecessary, equating to a waste of $1.7 million. The balance, $900K, was directly attributable to the fire.

6.0 THE CLEANUP OF THE T&S BUILDING WAS LARGELY UNNECESSARY

6.1 1994, 1995, and 1996 Data Analysis

A review of the records of wipe, bulk and air samples collected throughout the project show that the building was nearly clean already (see Tables 1 and 2), and that minimal recleaning would have been required once a proper asbestos abatement (including duct and ceiling tile removal) had been completed.

The wipe sampling program, largely completed in 1994 but never used to develop the decontamination strategy (note that Gannett Fleming elected to do their own assessment before designing the cleanup), consisted largely of samples biased toward finding PCBs rather than a uniform grid spacing, and even then showed that the average PCB levels in both high and low contact areas on non-fire floors already met the EPA standards (Table 3). This fact seemed to have been lost on the inexperienced state project team.

The failure to promptly initiate cleanup resulted in 2.5 more years of air sampling and fire watches without definable progress. The air sample results continued to show that the building was well below even the NIOSH guideline for airborne exposure, yet it took the state over a year to further reduce the sampling frequency.

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6.2 Actions Taken to Clean/Manage Furniture, Office Equipment

Data collected from office furnishings both in the building and in storage showed that the average concentrations were again below risk-based standards, and that these data were shared with the state in a formal report and presentation. Because several of the samples were above the standard, it would be reasonable for the state to either do spot cleaning or replace the item in question, again as part of the fire-related loss. Choosing to dispose of any large group of items was not supported by the data; the Kimball work in this regard was unnecessary, wasting millions of dollars in testing cleaning, recleaning, and disposal.

6.3 Mega-Rule Impacts on the Cleanup Decision Process

Most of the changes brought about by the 1998 PCB Disposal Amendments were clearly broadcast as part of the original EPA proposal, published in time (December 1994) for these changes to be factored into the choice between cleaning and demolition.

Taken in total, the changes minimize the amount of PCB cleanup that would have been required if the building were to be reoccupied, and dramatically reduce the cost of waste disposal if the building were demolished. These savings could have been realized if the demolition had been postponed for only months, or negotiated with EPA based on their intent in the rule proposals.

Re-occupancy following decontamination of workspace. Decontamination standards are now established on the basis of risk, tied directly and proportionately to the degree of human exposure expected. The 10 ug/100 cm^2 standard for "high occupancy areas" is based on a continuous exposure for 24 hrs/day, 7 days/week. The corresponding low occupancy standard is 100 ug/ 100 cm^2 and assumes 6.7 hours per week of exposure.

Site characterization guidelines are provided, which largely mimic many of the concepts embedded in the original spill policy guidance for closure (sampling grids, etc.), but do not need to be used in place of engineering judgement.

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Disposal of Debris Following Demolition. The rule codifies the relationship between surface contamination and bulk concentration for purposes of disposal. A wipe sample result of 10 ug/100 cm^2 on a non-porous surface is considered the equivalent of 50 ppm.

EPA has established a waste category called "PCB Bulk Product Waste", which includes (a) non-liquid bulk wastes from the demolition of buildings...coated or serviced with PCBs (excluding demolition debris from a spill) and (c) ...applied dried paints..., caulking, adhesives, ...sound deadening or other types of insulation, and felt or fabric products. EPA also established a category called "PCB Remediation Waste", which means waste containing PCBs as a result of a spill (including demolition debris contaminated by a spill). Bulk product waste can be disposed of in a municipal landfill or used as road bed material, among other things.

Relevance of Disposal Amendment to T&S Building Re-occupancy. The applicable standard for PCB contamination in the occupied workspace is probably EPA's so-called "high occupancy" standard of 10 ug/100 cm^2, although it is based on around–the-clock occupancy. Based on the average of all wipe sample results available to the state, almost all of the space outside of floors 4-7 met these criteria.

The similar standard for "low occupancy" is 100 ug/100 cm^2, although the value could be weighted in proportion to time exposed (see previous point). Low occupancy areas in the T&S building would include any of the mechanical rooms and equipment, electrical troughs and Q deck, plenum area above the ceiling, mainframe computers and the computer room.

Characterization standards now exist for cleanup of both intentional and unintentional contamination, based on grid sampling. Grid sampling was already the standard approach to characterization before the rules were finalized. Grid sampling was not performed at the T&S building.

Relevance of Disposal Amendment to Waste Disposal from T&S Building Demolition. Disposal of light ballasts with small PCB capacitors in a municipal landfill is permitted, regardless of quantity.

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Under the final rule, PCB-containing caulk, ductwork, and other materials of construction that are either removed or become part of demolition debris can be disposed of in a municipal solid waste landfill as long as they did not become contaminated as a result of an accidental spill.

The asbestos fireproofing (insulation) can also be managed as non-PCB waste given that the average PCB concentration was below 50 ppm.

7.0 SOURCES OF PCB IN THE BUILDING

7.1 Intentional Uses of PCB in Building Products

Numerous intentional uses of PCB were present, none of which represented a direct exposure risk to occupants.

Duct Insulation. PCBs present in the ductboard adhesive did not vaporize and distribute themselves throughout the building, except as a direct result of the fire. Aroclor 1262, as used in the adhesive, was found in almost none of the air samples. Aroclor 1262 has almost no vapor pressure at room temperature.

Nevertheless, Ewing performed a series of experiments in 1997 attempting to show that the slightly elevated temperatures common to ventilating ductwork during heating would increase the vapor pressure of the ductboard PCBs enough to create "off-gassing" to such an extent that the ambient air levels would increase and PCBs would be carried throughout the building and back into the air plenum containing the asbestos fireproofing. According to Ewing, the extremely high temperatures used in the experiment were able to increase PCB loss, the loss rate observed was so incredibly high that all of the PCBs in the duct would have vaporized within the first four days after they were installed. In reality, there is no evidence that the duct board suffered any appreciable PCB loss over decades of service. The Ewing experiments and/or the experimental design were clearly flawed.

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Even assuming for this discussion that small sections of the duct and adhesive had in fact been subjected to the high temperatures used in the Ewing experiments, any "vapors" would have condensed before leaving the ductwork and entering the occupied work space. Building interior surface sample results after 25 years of ventilation would be expected to show extremely high PCB (1262) levels, but did not. Furthermore, the data show the distribution of PCB air sample results by Aroclor for all floors of the building, clearly showing that Aroclor 1242 was the predominant Aroclor present, and that Aroclor 1262 (1260) was found in only a small percentage of samples and on only 2 of the floors. The presence of both is clearly attributed to the fire.

Caulk. There is no evidence of PCBs entering the building interior that would have originated from the exterior building caulk, either before or after the fire. Neither air nor wipe samples from the building interior contained Aroclor 1254, the PCB blend known to have been used in the caulk. Caulk was demonstrated during the cleanup to have adhered to adjacent surfaces of the precast concrete panels, which is to be expected given the need for the material to anchor itself to the building. There was no evidence, however, that the PCBs had penetrated the concrete at all, and certainly not enough to have entered the building interior.

Light Ballasts. Light ballasts containing PCBs were known to be present in the building. Most of those fixtures outside the sixth floor had reportedly been replaced. There is no evidence that any of these fixtures leaked and released PCBs. Furthermore, the state suggested in several reports that over 200 light ballasts were destroyed in the fire, yet examination of photo records and analysis of light spacing in the building suggests that at most only 30 or so were even damaged. Those ballasts damaged in the fire are the source of Aroclor 1242 found in the building after the fire.

7.2 Unintentional Uses of PCB

Several unintentional uses of PCBs were present. None of these uses appear to be the result of a loss of PCB from other intentional uses, but probably resulted in re-release and distribution throughout the building during the fire.

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The most noteworthy example of an unintentional use of PCBs was the asbestos fireproofing, which was shown to contain PCBs both before and after the fire. PCB results for the asbestos showed a relatively constant PCB concentration, with only 2 of the floors displaying a statistically significant difference from the other floors (Tucker, 1996). Stratified sampling of intact fireproofing at that time (using cores of asbestos split to divide the exposed and buried sections) also showed no statistical difference between the surface and buried portions, clearly indicating that most of the PCBs must have been present as a contaminant from the fireproofing installation. Both Aroclor 1242 and 1260 were detected.

Additional sampling by Kominsky (1998) produced several additional findings that further confirmed that most of the PCBs in the fireproofing predated the fire:

- Aroclor 1254 was detected in almost 50 percent of the samples at levels ten times higher than Kominsky considered common background levels in office buildings; there is no known source of Aroclor 1254 in the building, yet this was ignored in the Kominsky report. More importantly, almost all (80%) of the Aroclor 1254 findings were in the "inner" samples (against the ceiling), none of which showed detectable Aroclor 1254 on the "outer" layer. Because it would be impossible for the Aroclor 1254 to penetrate the fireproofing without being present on the surface exposed to the plenum, some if not all of the PCBs were clearly present from the original fireproofing installation.

- Aroclor 1242, generally attributed to fluorescent light ballast capacitors, was only found at elevated levels on the sixth floor on the outer (exposed) fireproofing stratum, indicating it was deposited from the fire-damaged light fixtures.

- Aroclor 1260 (1262) was found by Kominsky in only 35 of 60 samples, and most (25/35) of those samples were outer (exposed) fireproofing. This finding is consistent with the theory that the PCBs, particularly 1260 and 1242 were deposited by the fire.

- Only one of the 60 samples showed PCB levels above 50 ppm, which if part of the fireproofing installation would not require that all of the fireproofing be managed as a PCB waste. If the contamination was the result of a release from a spill or fire, management of the waste as well as the abatement cost would be part of the insured response.

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The Salt Lake City example cited in the Kominsky report is irrelevant to his T&S PCB migration theory. The PCBs in question at that site were contained in an exposed coating material rather than an adhesive material insulated from the air stream.

Furthermore, the whole theory of Aroclor 1260 (1262) movement through the building defies both science and common sense, and is not supported by the data. Even if any PCB vapors were being released from the ductwork immediately adjacent to the heater exhaust, they would condense before leaving the duct (as the Ewing tests clearly show) and entering into the workspace. The Kominsky theory then requires that the PCBs entering the ambient building air (without somehow being detected in almost 2,000 air samples collected over 2 years) are then drawn back into the air plenum above the ceiling (rather than being deposited on building surfaces like other dust) but then choose to deposit on and penetrate vertically upward into the fireproofing.

Finally, samples of asbestos debris were collected before the fire by Ewing and analyzed recently for this report. These samples presumably represent "outer" fireproofing that fell on the top of the ceiling tiles over a period of years. The results of the analysis, presented in Table 5, show that the pre-fire PCB contamination consisted entirely of Aroclor 1262 at an average *pre-fire* concentration (3 ppm) well below the average concentration determined by Kominsky (17.7 ppm) *after* the fire. This comparison suggests that most of the Aroclor 1262 and all of the Aroclor 1242 was deposited by the fire and should have been insurable. These same samples were available to the state before the fire and could have readily been used to make the same argument immediately after the fire. Aroclor 1260 was also found in fireproofing from the Milton Hershey School and South Office Building at levels comparable to the pre-fire T&S data.

PCBs were found in low concentrations in the carpet and tile mastic. At these levels, which are commonly found in many buildings, the PCBs have no functional value and more likely an unintentional contaminant brought in during the original carpet/tile installation.

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Table 5

PCB Sample Results for Pre-Fire Asbestos Refuse [1] From Transportation and Safety Building

Sample ID No.	Description	Pre-fire PCB Concentration (ppm) [2]	Kominsky Average (1260 Outer)
450		0.10	N/A
451		0.12	N/A
452		0.15	N/A
453		ND	N/A
454		0.13	N/A
455		0.21	N/A
456		0.31	N/A
457		0.08	N/A
458		0.26	N/A
459		0.44	N/A
460		ND	N/A
461		0.29	N/A
462		0.10	N/A
463		0.37	N/A
Average, 400		0.19	N/A
63450	11th floor	6.0	**80.0**
63451	10-2	7.4	**16.0**
63452	9-1	10.0	**25.0**
63453	7-2	2.8	**18.0**
63454	6-2	6.6	3.0
63455	5-1	15.0	0
63456	G-1	2.5	**12.0**
63457	G-2	1.8	**12.0**
63458	2-1	2.4	**24.0**
63459	B-3	5.8	**20.0**
63460	4-1	4.6	**8.0**
63461	3-2	11.0	**22.0**
63462	2-2	3.6	**24.0**
63463	1-2	0.98	**16.0**
Average, 63000		5.7	
Average, overall (outer)		3.0	17.7

N/A Not applicable.

[1] Samples collected by Ewing from top of ceiling tiles, presumably "outer" fireproofing from the insulation above.

[2] All sample results showed only Aroclor 1262; the detection limits were typically below 1 ppm and often below 0.1 ppm.

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7.3 PCB Movement Throughout the Building From the Fire

Evidence clearly shows that several PCB containing building products were burned in the fire (duct board and light ballasts, containing Aroclor 1262 and 1242/1016, respectively). Records also indicate that the ventilation system continued to operate for up to 4 hours after the fire began, and the data from surfaces throughout the building (if detectable) showed Aroclor 1242 on all floors, including the air samples. Smoke and soot with PCBs would have come in contact with ductwork as well as the asbestos insulation. Aroclor 1260/1262 was only found in less than 1% of the air samples taken in the 2 years following the fire, even those taken from the occupied areas when the HVAC system was in full operation.

8.0 THE STATE, ITS STAFF, AND ITS CONTRACTORS MISMANAGED THE CLEANUP

8.1 The Immediate Post-Fire Approach Was Not Managed as a Cleanup

The state and its contractors devised no short or long term plan for remediation, and had no clear objective except to monitor for monitoring's sake. The testing undertaken during the first 2.5 years after the fire did not advance the cleanup or demonstrably affect employee safety.

Once the fire restoration contractors had finished removing the visible soot within the first few weeks and the presence of PCBs was discovered, the response contractor (EPS) and their primary subconsultant (Cocciardi) simply began sampling without cleanup as a goal. Furthermore, the state showed no sign of wanting cleanup to occur, despite having ample insurance coverage to pay for it.

To further illustrate the lack of tangible progress or direction:

- The data were not logged and plotted to show which areas/surfaces/materials were contaminated.
- Test cleaning was not even attempted for almost a year.

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- The consultants on the site (particularly Cocciardi and Associates) had no experience with projects of a similar scale and nature.
- The State and its contractors made no serious attempt to contact experienced firms for advice or assistance.
- Contacts were limited primarily to NIOSH (1994-95) and EPA (1995-97), neither of which perform cleanups.

The only known individual on the project with any documented experience with similar cleanups (Shortsleeve) was employed by a fourth tier consultant, had no experience with office buildings, and was not added to the project until 1997 when it was too late to make a difference.

It was not until Gannett Fleming took over as project engineer in 1996 that the data were properly reviewed, sorted, plotted and analyzed with remediation in mind. Unfortunately, they also questioned the value of the existing data, essentially discarded it, and a new data set was collected anyway. The new data were not designed to characterize occupant exposure, but rather to assist in demolition waste characterization.

8.2 The Hiring Process for Qualified Contractors

The typical commercial management of any chemical release consists of the initial response and containment, assessment and scoping of the problem, and engineering and implementation of the remedy. When the presence of PCBs was discovered following the fire response, EPS was retained and they retained Cocciardi to provide field support. In a matter of days, Cocciardi was essentially doing the project for EPS and hiring staff to fill in on various support assignments.

Cocciardi was eventually hired in September, 1994 to take over the project, which at that time still consisted largely of monitoring the occupied workspace without initiating any cleanup. The state chose not to solicit additional consultant input despite the lack of experience at Cocciardi and their rapidly expanding staff. When the state finally decided after 12 months to "competitively" bid the continuation of the project they still again chose Cocciardi over numerous other qualified bidders, even though the Cocciardi bid was the highest.

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Perhaps more significantly, the services of Cocciardi and other consultants would not have been needed at all if the state had done what other building owners do under similar circumstances, and would have instead experienced the 12 week remediation scenario described above.

In short, the state started off on a course of indecision and inaction early in the project, and perpetuated the problem by re-hiring the same unqualified contractor without cost management or technical justification. This flawed process resulted in errors, inaction, and misinterpretation of the governing regulations, all of which could have been avoided. Similar incidents had been occurring under the existing PCB regulations for over 15 years, and the professional expertise needed at the T&S building was available. The state never bothered to contact other parties for references, or even advertise outside of the immediate area for help (in a profession that works internationally).

8.3 Management of the Project by the State

Supervision of expert contractors by the State consisted primarily of periodic meetings and letters, with neither side understanding the problem. Probably the most striking observation one makes in reviewing the history of this project is the lack of leadership. State employees claim they depended entirely on their contractor(s) for their advice and expertise, which evidence shows they did not have. Cocciardi, when asked what direction he was given by his client, points to conversations and meetings with state people having even less expertise than he had.

The project record shows extensive documentation of issues and problems, many of which were never resolved or referred to the EPA for their input. When it came time to begin the cleanup in 1996 a new contractor was selected, one with no experience in similar projects, either. That contractor in turn hired another contractor (Pennoni) that also had no experience.

8.4 Impact of Inexperience on Cost and Schedule

Lack of state and contractor experience with PCB remediation resulted in wasted effort and unnecessary work. The list of decisions and work assignments resulting in wasted time and effort

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is long. Most of these actions were part of a pattern of indecision on the part of the state/Cocciardi team (such as deciding to store fire debris on the 6th floor instead of disposal, and paying for several years of "fire watch" time in level B protection [a multi-million dollar non-decision]).

Unfortunately, agency contact/negotiation is the most important part of any PCB cleanup of this magnitude, a fact that seemed to be lost on the state when setting forth their contractor selection criteria. Cocciardi's experience dealing with any agency on PCB cleanups was limited, and certainly didn't involve the same EPA Region III contacts involved in this project.

8.5 All Parties Failed to Clean Floors 4-7

One of the cardinal rules in any spill cleanup is to remove the most highly contaminated debris and other media first, in order to avoid recontaminating other parts of a building. The debris stored on the 6th floor, as well as the dusty PCB contamination allowed to remain there on the floor certainly allowed contamination to move around the fire floors and perhaps extend to other locations. The test cleaning clearly illustrated the existence of contaminated dust from the 6th floor, dust that was probably resuspended in the air and redeposited elsewhere every time a contractor walked by.

Strangely enough, ample insurance coverage existed for this work to be promptly completed. Significant saving in project costs, including virtually all of Cocciardi's charges, could have been realized if the work had been done immediately.

8.6 All Parties Failed to Clean Occupied Floors

Even under the NIOSH standard, insurance cost recovery could have been used to complete work right away. Cleanups have been successfully performed in real PCB fires, where dioxins have been formed and the PCB standard has been 1 ug/100 cm^2 or less, and contamination has been much higher and more widespread that at the T&S building. In most of those cases I have been involved in, the loss was correctly attributed to the fire and insured. The technology has been

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available to do this work for more than 15 years and is routinely deployed by qualified contractors.

There was no documented effort made to enlist the help of qualified contractors on the T&S project, either through direct contact with EPA/NIOSH or solicitation through common trade journals for this aspect of the environmental business. Many of these contractors and consultants had completed similar projects, including those involving more stringent standards.

The T&S building could have been cleaned to even the NIOSH levels within the same 12 week period discussed above. However, there were no regulatory reasons to clean beyond either the risk-based or EPA PCB Spill Policy standards.

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JOHN P. WOODYARD, P.E.

Registration

Registered Professional Engineer in the States of California, Colorado, and in the Commonwealth of Virginia
Qualified Environmental Professional (QEP)

Fields of Competence

PCB management, including audits of past and present practices; regulatory interpretation/compliance; plant and equipment chemical decontamination; spill response and cleanup, and site assessment and remediation under CERCLA and TSCA; property transfer audits, particularly for plant buildings and equipment; hazardous waste incineration and treatment technology, including siting, permitting, and management of fossil fuel combustion waste.

Experience Summary

Over 22 years of professional experience in electric power and natural gas industry waste management, conducting projects ranging from siting, permitting, and engineering of waste management systems to field implementation and technical direction of major remedial projects. Active in siting, permitting, and planning for fixed and mobile waste treatment/disposal systems, including over 50 incineration, chemical treatment, and energy recovery projects. Recognized expert in PCB management and TSCA; has conducted seminars and presented papers on all aspects of PCB management, regulatory interpretation, emergency response, and remediation/ decontamination.

Credentials

M.S., Mechanical Engineering — University of Illinois (1976)
B.S., Industrial Engineering — University of Illinois (1974)
Air and Waste Management Association

- Chairman, Waste Division (1985-1988)
- Chairman, Technical Council (1993-1996)
- Fellow Member (1995)

Editorial Review Board, *Journal of the American Waste Management Association*
Editorial Review Board, *Journal of Environmental Regulations*
Institute for Professional Environmental Practice, Exam Advisory Committee (QEP)

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Employment History

1988-Present	WESTON
1983-1988	International Technology Corporation
1975-1983	SCS Engineers
1974-1975	U.S. Army Construction Engineering Research Laboratory

Key Projects

Management of PCB Mixed Waste for Nuclear Plant Decommissioning Project, Massachusetts, Yankee Atomic Electric Company, Consultant. Supported client's efforts to assess extent of PCB-containing paint as part of decommissioning operations at their Rowe, MA plant. Work included drafting and/or review of various regulatory interpretation, sampling plan, remedial management, and permit application documents.

Assessment and Remedial Oversight, PCB Spill/Fire at Substation Offices, Florida, Florida Power and Light, Project Director. Responsible for building contamination assessment, remedial options analysis, and remedial oversight for demolition of former power plant building in Miami Beach contaminated by PCB fire. Work included two phases of remedial procurement specification and field management of remedial and waste disposal contractors over a 9-month period of performance.

RSE-EE/CA Consulting Support for PCB-Contaminated Buildings at NPL Site, PCB Inc. Steering Committee, Consultant. Provided technical support to Technical and Allocation Committees for assessment and remedial planning stages of CERCLA project, at former site of PCB treatment contractor/broker. Participated in generating or reviewing all technical documents and negotiation of innovative risk assessment implementation strategy with EPA Region 7.

Engineering Support for Management of PCB-Containing Groundwater at MGP Site, Maryland, Baltimore Gas and Electric, Project Director. Provided engineering support to management of process residuals from the treatment of PCBs from groundwater and floating product at long-term remedial project site. Scope included development of EPA negotiating strategy and associated process monitoring plan.

Power Plant PCB Decontamination, Assessment and Remedial Engineering, Austin, TX, City of Austin Electric Utility Department, Project Director. Conducted plant interior contamination assessment following discovery of vent screen oil bath cross contamination, developed plant and drain line decontamination specification for bid, and managed remedial program on site.

PCB Contamination Assessment and Remedial Technology Research Program, Gas Research Institute, Project Director. Manage their multi-year PCB management research program in

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Key Projects (continued)

support of gas transmission and distribution companies throughout the U.S. Responsibilities include monitoring and assessment of PCB remediation technologies, statistical sampling guidance, and risk assessment. Additional activities include case study monitoring of ongoing remediation projects and innovative remedial technologies.

Natural Gas Systemwide PCB Contamination Assessment, Midwestern Gas Transmission Company, Project Director. Responsible for developing system sampling strategy, data interpretation, and development and negotiation of PCB management/remediation work plan with EPA.

Electric Substation PCB Assessment and Remediation, San Antonio, TX, City Public Service, Project Director. Responsible for assessment of PCB contamination at four substations, including agency negotiations, work plan development, and remedial specifications and construction oversight.

TSCA Compliance Audit, Electrical Components Manufacturing Facility, Project Director. Internal compliance audit for major manufacturing facility, including litigation/penalty defense.

TSCA Compliance Audit and PCB Management Plan, NAWS Pt. Mugu, CA, Project Director. Responsible for on- and off-shore inspection of PCB equipment and records, and development of an updated management plan conforming with state and federal requirements.

PCB Spill Assessment and Remediation, Pennsylvania, Technical Advisor. Helped advise project team on complex spill situation in urban cemetery, with structural and cross-contamination impacts on adjacent hospital.

PCB Contamination Assessment, Remedial Planning, and Waste Management, U.S. Army Rocky Mountain Arsenal, CO, Technical Advisor. Responsible for advising Army and WESTON project personnel on decontamination/remedial technology selection, cleanup standards, and sampling/analytical strategy.

Electrical Substation PCB Assessment and Remediation, San Antonio, TX, City Public Service, Project Director. Responsible for assessment of PCB contamination at four substations, including agency negotiations, work plan development, and remedial specifications and construction oversight.

Natural Gas Systemwide Remedial Planning Support, Eastern Gas Transmission Company, Technical Advisor. Responsible for technical support to multi-state PCB remedial planning effort under CERCLA Administrative Order, focusing specifically on compressed air system decontamination.

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Key Projects (continued)

Power Plant Fire Contamination Assessment and Remedial Engineering, Northwest Lumber Mill, Project Director. Following fire that damaged nearby PCB equipment, initiated sampling and containment response on emergency basis. After results and risk assessment showed cleaning to be infeasible, developed demolition specification and managed waste disposal and demolition contractors.

Natural Gas Pipeline PCB Contamination Litigation, Various Location, Multiple Clients, Expert Witness. Supported gas transmission companies in several landmark suits involving inadvertent use of PCB valve grease in high pressure valves.

Remedial Design/Construction Oversight, Coal Creek (NPL) Site, Washington (Electric Utility PRP Group), Project Director. Implemented RD/RA involving on-site incineration of 10,000 tons of soil, tank removal, building demolition, and on-site landfill at a former transformer salvage yard.

Contamination Assessment, Remedial Engineering and Oversight, New York, NY, Project Director. PCB, lead, mercury, and asbestos contamination assessment, engineering specification and remedial construction management at New York City's Kensico Reservoir Shaft 18, involving a full complement of sampling and decontamination technologies in a particularly sensitive environmental setting.

PCB and Asbestos Removal from a Former Power Plant Site, City of Austin, Texas Power and Light, Project Director. Implemented state RCRA remedial design, construction, and closure program for abandoned power plant foundation, underground tanks, and wet well that were allegedly backfilled with PCB and asbestos-containing soil.

PCB Disposal Manual, Electric Power Research Institute, Project Manager. Responsible for development of the first (1979) and second (1985) editions of the Manual.

Case Study Evaluation of PCB Fires, Electric Power Research Institute, Project Manager. Development comprehensive analysis of two major PCB fires in San Francisco, CA and Binghamton, NY, including specific recommendations for utility risk management.

PCB Spill and Fire Litigation/Arbitration, Various Locations, Multiple Clients, Expert Witness. PCB spill and fire litigation/arbitration for major cleanups in San Francisco, and Palo Alto, CA; Harrisburg, PA; Chicago, IL; Salt Lake City, UT; Teague, TX; Santa Fe, NM; and Canton, OH.

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Key Projects (continued)

PCB Decontamination of Die Casting Facility, Central Illinois, Project Director. PCB contamination assessment and remediation in operating die-casting facility, including engineering of wastewater treatment system modifications and decontamination/encapsulation of plant floor and drainage system.

PCB Spill Cleanup Modeling Support, Edison Electric Institute, Project Manager. Developed spill scenarios and modeling cost statistics in support of utility comments on "Totally Enclosed" rule.

Closure Plan Development and Implementation, State of California, Project Director. Developed and implemented closure plans for 10 state PCB waste storage facilities at Department of Corrections sites.

Assessment and Remediation of Past PCB Contamination at an Operating Electrical Component Manufacturing Facility, Project Director. Work included preliminary and detailed assessment of contamination in and around plant, employee risk assessment, standards negotiation with state regulatory agency, remedial design, and decontamination of plant equipment.

Specialty Chemical Plant Assessment and Remedial Design, Project Director/Technical Advisor. This project involved a chemical plant where PCBs had been used as a heat-transfer fluid. Work included sampling, assessment, cleanup standards negotiation, remediation, and expert-witness testimony.

Contamination Assessment and Remediation, Connecticut, Technical Advisor/Project Director. Assessment and remediation of chemical contamination at an operating electrical component manufacturing facility. Work included preliminary and detailed assessment of contamination in and around plant, employee risk assessment, standards negotiation with state regulatory agency, remedial design, and decontamination of plant equipment.

Emergency PCB Spill and Fire Responses, Various Locations, Multiple Clients, Project Director/Technical Advisor. This project involved numerous emergency PCB spill and fire responses and subsequent remedial efforts, including LSU Medical Center, Shreveport, Louisiana; Columbus and Southern Ohio Electric Company, Columbus, Ohio; Owens Illinois, Oakland, California; Exxon, Baton Rouge, Louisiana; NASA, Cleveland, Ohio; and Pennsylvania Power and Light, Scranton, Pennsylvania.

Electrical Equipment Survey/Audit, Various Locations, State of California, Project Manager. PCB electrical equipment survey/audit at 94 State of California facilities, including TSCA compliance and electrical code inspection, remedial engineering and cost estimates, and PCB disposal/management plans statewide.

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Key Projects (continued)

Permitting of Cement Plant, California, IT/Genstar, Project Manager. Responsible for proposed permitting of a cement plant to burn PCB and solvent wastes as fuels.

Research, Planning, and Design, Various Locations, Multiple Clients. Directed numerous research, planning, and design projects involving innovative PCB treatment and technology, including KPEG, retrofill, and in situ treatment technology. Also responsible for contract preparation, negotiation, and license administration.

Publications

Woodyard, J.P. 1996. "PCB Management and Technology Options Under the Proposed Mega-Rule." Presented at the APPA Engineering and Operations Conference, Salt Lake City, Utah, March 26, 1996.

Woodyard, J.P., D.G. Linz, M.B. Tomson and A.T. Kan. 1995. "Solvent Selection for PCB Decontamination of Equipment Surfaces." Presented at the EPRI PCB Seminar, Boston, Massachusetts, August 30, 1995.

Linz, D.G, and J.P. Woodyard. 1995. "Update on PCB Removal from Gas Pipelines," Presented at the IGT Hazardous Waste and Environmental Management in the Gas Industry, Albuquerque, New Mexico, January 24-25, 1995.

Woodyard, J.P. 1995. "EPA Issues Proposed PCB 'Mega-Rule'," *Journal of Environmental Regulations,* Spring 1995

Sweeney, D., J.P. Woodyard and K. Gough. 1995. "Managing PCB Spills and Fires at Forest Product Manufacturing Facilities." Presented at the TAPPI Conference, Atlanta, Georgia, May 7, 1995.

Woodyard, J.P., D.G. Linz, and E.C. Geer. 1993. "Prediction and Control of PCB Migration in Gas Pipelines." Presented at the Pennwell PCB Forum, Houston, Texas, March 15, 1993.

Linz, D.G., J.P. Woodyard, and E.C. Geer. 1993. "New Understandings in Prediction and Control of PCB Migration in Gas Pipelines." Presented at the IGT Hazardous and Environmentally Sensitive Waste Management in the Gas Industry, Albuquerque, New Mexico, January 20-22, 1993.

Woodyard, J.P. and C.B. Amandes. 1993. "Current Trends in PCB Regulation and Enforcement." *Journal of Environmental Regulation*, Winter 1992/93.

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Publications (continued)

Woodyard, J.P., C.A. Hays, and K.J. Shortsleeve. 1993. "Waste Minimization Practices in Chemical Decontamination." Presented at the EPRI Non-Combustion Waste Seminar, Orlando Florida, December 3, 1992.

Woodyard, J.P., J.M. Taylor, and T. McVeigh. 1992. "PCB Data Management and Recordkeeping: Current Practices and Trends." Presented at the Pennwell PCB Forum, Houston, Texas, March 30, 1992.

Frank, J.R. and J.P. Woodyard. 1991. "Examination of PCB Management Technology Issues." Institute of Gas Technology Conference: Hazardous and Environmentally Sensitive Waste Management Issues in the Gas Industry, Chicago, Illinois, July 16, 1991.

Woodyard, J.P., R.T. O'Connor, and K.J. Shortsleeve. 1991. "PCB, Mercury, and Lead Decontamination from a Municipal Water Supply Facility." EPRI PCB Seminar, Baltimore, Maryland, October 4, 1991.

Woodyard, J.P. 1991. "State-of-the-Art PCB Spill Cleanup." American Public Power Association Engineering and Operations Workshop, Orlando, Florida, February 28, 1991.

Linz, D.G. and J.P. Woodyard. 1991. "Gas Research Institute Pipeline PCB Research Program." American Gas Association Annual Meeting, Nashville, Tennessee, April 30, 1991.

Woodyard, J.P. and J.J. King. 1991. *PCB Management Under TSCA*. Second Edition, Executive Enterprise Publications, New York, New York, 1991.

Woodyard, J.P. 1990. "Current Approaches to PCB Spill Cleanup in the U.S." Presented at Dioxin '90, Bayreuth, Germany, September 14, 1990.

Linz, D.G. and J.P. Woodyard. 1990. "PCB in Gas Pipelines: Technical Issues and Control Technologies." Presented at the Institute for Gas Technology, Gas Quality Measurement Symposium, Chicago, Illinois, July 16-18, 1990.

Woodyard, J.P. 1990. "PCB Detoxification Technologies: A Critical Assessment." *Environmental Progress*, Vol. 9, No. 2, May 1990.

Woodyard, J.P. 1989. "Comparative PCB Regulation and Policy Interpretation Between Gas and Electric Utilities." Presented at the EPRI PCB Seminar, San Diego, California, October 3-9, 1989.

Woodyard, J.P. 1989. "PCB Detoxification Technologies—A Critical Assessment." Presented at the AIChE Summer Annual Meeting, Philadelphia, Pennsylvania, August 23, 1989.

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Publications (continued)

Woodyard, J.P. 1988. "Buying and Selling PCB-Contaminated Real Estate." Presented at the EEI Environmental Auditing Forum, New Orleans, Louisiana, October 18, 1988.

Woodyard, J.P., and J.J. King. 1987. "Recent Technology Developments for PCB Destruction and Oil Recycling." Presented at the DOE Oak Ridge Model Conference, Oak Ridge, Tennessee, October 16, 1987.

Woodyard, J.P. 1987. "Commercial Non-Sodium Treatment of PCB-Contaminated Mineral Oil." Presented at the EPRI PCB Seminar, Kansas City, Missouri, October 6-9, 1987.

Woodyard, J.P. and E.M. Zorrato. 1987. "The Use of Liquid Reagent for In-Situ Treatment of PCBs in Concrete and on Surfaces." Presented at Electric Power Research Institute, PCB Seminar, 1987.

Woodyard, J.P. and R.L. Wade. 1986. "Sampling and Decontamination Methods for Buildings and Equipment Contaminated with Polychlorinated Dibenzodioxins." Presented at the American Chemical Society, Division of Environmental Chemistry Symposium, New York, New York, May 17, 1986.

Woodyard, J.P., and E.M. Zoratto. 1986, "State-of-the-Art Technology for PCB Decontamination of Concrete." Presented at the Institute of Electrical and Electronics Engineers Conference on PCBs and Replacement Fluids (Motech '86), Montreal, Quebec, October 1, 1986.

Woodyard, J.P. 1985. "State-of-the-Art Decontamination Technology for PCB Spills and Fires." Presented at Hazmat 85, Long Beach, California, December 3, 1985.

Woodyard, J.P. 1984. "Available PCDF Decontamination Technology and its Ability to Meet Standards." Presented at the EPRI PCB By-Product Formation Workshop, Palo Alto, California, December 4-6, 1984.

Woodyard, J.P., W.C. Trench, P. McCormick, and T. Juhasz. 1983. "The Cost of PCB Spill Cleanup: A Question of Degree." Presented at the EPRI 1983 PCB Seminar, Atlanta, Georgia, December 6-8, 1983.

Carr, R. and J.P. Woodyard. 1982. "SPCC Plans, Storage Facility Designs, and PCB Equipment Inventory Procedures." Presented at the NRECA PCB Seminar Series.

Woodyard, J.P., P. Hypnarowski, and J. Tappa. 1981. "PCB Equipment Inventory and Management Plan for State of California Facilities." Presented at the EPRI PCB Seminar, Dallas, Texas, December 1-3, 1981.

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