CURRENT EPRI PCB PROJECTS

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ABSTRACT

EPRI's current efforts are aimed at the remaining, well recognized PCB problems: to minimize the cost and effort of spill cleanup; and to eliminate transformers in the PCB and contaminated categories. Both of these will serve to reduce cost and lower the potential for future liability.

Background

EPRI's efforts in the PCB area are in response to EPA regulations and local ordinances. Little, if any, effort has been made in the field of health effects. The major goal has been to aid U.S. utilities in managing cleanup and disposal problems, and in applying risk analysis to determine the choice between alternative courses of action.

1. Results

A. Contaminated Transformer Reclassification

The current policy of the U.S. Environmental Protection Agency (EPA) for reclassification of PCB contaminated transformers (50-499 ppm) requires operation at 50°C for three months before analysis to confirm <50 ppm PCB. This process is costly, potentially unsafe and in some cases, it is impossible to reach 50°. An EPRI project (1) sought to determine the validity of this requirement. Our contractor ran material balances on the liquid remaining in 5-25 kVA transformers after draining PCB contaminated mineral oil; he determined that more than 90% of the original fluid had been removed and that the ratio of PCB/mineral oil absorbed by the cellulosic material was not significantly different from the ratio in the original fluid. This indicated that transformers containing up to 50 ppm PCB could be reclassified safely by one careful change of fluid without having to operate at 50°C for three months before the final analysis. Calculations showed that in one company's series of transformers, the ratio of oil volume to residue changed favorably as the transformer size increased, indicating that this procedure should be valid for any size transformer. We also found that with a single additional rinse, the residue from the original volume was so diminished that it should be possible to carry out the same procedure with oil containing up to at least 2500 ppm PCB. The EPA is now granting requests for simplified reclassification on an individual basis with proper documentation. EPRI's work is ongoing toward a realistic revision of the policy to permit blanket reclassification after proper draining and refilling.

B. Askarel Transformer Scrapping

Until recently, the only recourse the owner of an askarel transformer had for its elimination, was to retrofill several times over a period of time with a replacement fluid (a costly and time consuming process) or to dispose of it in a toxic waste landfill after removing the PCB and providing an additional flush. The utility retained liability for the carcass in the landfill in the event that said landfill might have future problems or become a Super Fund site. In addition, the regulations currently do not permit detanking an askarel transformer for disposal or repair.

EPA has now granted permits to a few disposal companies to experimentally detank askarel transformers for dismantling and cleaning the component parts. This would permit recycling or scrapping in which the components lose their PCB identity. However, current permits require that these components be cleaned to a surface PCB level equivalent to 2 ppm PCB in oil in the original volume of the equipment. This is an onerous task. EPRI, again under EPA experimental permit, dismantled Askarel transformers (1), cleaned the component scrap and determined the contamination level that would be present to be equivalent to 49 ppm (after removal and incineration of the cellulosic material), since EPA does permit disposal of mineral oil contaminated at this level as a non-PCB item. If this principle gains acceptance by the EPA, a considerable easing of disposal requirements would result.

C. Development of A New Analytical Standard for Non-Askarel PCB

The current analytical standard for PCB is unrelated to current needs and is based on congener proportions of PCB as a chemical byproduct. In a number of current processes, such as biodegradation, sodium or KPEG treatment, extraction, or evaporation from a spill, the ratio found in the original askarel has changed and no related analytical standard is available. A new analytical standard may be more suited to current needs (6).

D. Standardization of PCDF Analytical Technique for Separating Most -Toxic Congeners

If PCDF is formed as a result of fire or other accident, and the subsequent analysis is not capable of adequately separating the congeners, regulations require calculation of the toxicity as that of the most toxic congener present. EPRI ran a round-robin in which several laboratories analyzed samples with emphasis on the best possible separation of the PCDF congeners present (2,3). The results were statistically analyzed by another laboratory (4), and finally a new laboratory developed a technique combining the best features of all the analytical methods(5). A workshop on this analysis and other PCDF items was held in June 1990 in Palo Alto.

E. Survey of PCB Equipment Remaining at Electric Utilities in 1989

This was a follow-up on the survey made by EEI/RPC for the EPA in 1982. The survey of electric utility equipment (1) showed a decrease of 56% in the weight of PCB in large capacitors, a decrease of about 50% in the PCB in askarel transformers, and a 14% decline in the PCB found in mineral oil equipment.

F. Risk Analysis

EPRI developed a number of risk analysis programs to aid in decision making involving health risks and economic risks. Health risk models cover PCB fires, spill cleanup and analysis of capacitor banks. Economic risk models determine optimum handling of PCB equipment in power plants, and compare alternative sampling strategies in sampling potentially PCB-contaminated equipment.

2. In Progress

A. PCB and Contaminated Oil Spill Outline Detector

EPA regulations now require rapid response to a contaminated oil or askarel spill, including determination of the outline and rapid cleanup. If the outline of the spill is not visible to the eye, it is necessary to go through a tedious and expensive statistical sampling of the suspected areas. A device using UV fluorescence is being developed by EPRI (7) to accurately and rapidly determine the outline of the spill. Development has proceeded to the point where contaminated oil spill outlines can be determined readily in daylight, and rapid progress is being made with askarel spills. A prototype instrument is being assembled and EPRI anticipates that equipment will be available before the end of the year.

3. Future

A. PCB Spill Dating

A project to determine the approximate age of a PCB spill is underway (RP2028-22). This work could be of value because the U.S. EPA has requirements and restrictions of varying urgency, depending on the date of the spill.

Complicating the issue are the facts that spills are exposed to a variety of degradative mechanisms, such as evaporation, biodegradation and ultra-violet oxidation, and also may have an unknown initial composition. It is reasonably certain that the technique will be limited to spills of one of the standard askarels and most certainly will not be usable in an area where a mixture of unknown PCBs was spilled.

B. PCB Spills On Concrete

PCB spills on concrete are a frequent occurrence. In addition, they present costly cleanup requirements because of the variable porosity of the concrete, and the possibility of the concrete being an integral part of a large, complicated and expensive structure. RFP2028-23, seeking imaginative means of removing or neutralizing PCB spills has been issued recently.

<u>References</u>

1. "PCB Residues in Transformer Carcasses", Palo Alto, California, Electric Power Research Institute, EL-6237.

2. "PCDF/PCDD in Utility Transformers and Capacitors", Palo Alto, California, Electric Power Research Institute, EL/EA-4858, Vol. 1-3.

3. Ibid. EL/5443, Vol. 1,2.

4. Ibid. EL/5443, Vol. 3.

5. "The Evaluation of PCDF Analytical Methodologies," Palo Alto, California, Electric Power Research Institute, EL-6416.

6. "A New PCB Analytical Standard," Palo Alto, California, Electric Power Research Institute, to be published.

7. "PCB and Contaminated Oil Spill Outline Detector", Palo Alto, California, Electric Power Research Institute, to be published.