

EPRI Draft Report TR-1003435: Dissolvable Clothing Questions and Comments to Draft Document

Sect.	Draft Report Reference	Question/Comments
Sum. (v)	Mentions 25% of industry has trialed PVA and states that the report captures summary data of their experience.	It appears this study was essentially a discussion of experience at two sites: Comanche Peak (garments) and LaSalle (mops/wipers). Is there any data available from others?
2.1	Implies that only problem in PVA's nuclear history was limited to processing.	Were there any product trials performed at actual nuclear facilities prior to this study?
2.2 (a)	2 nd sub-bullet - the small percentage of seam failure data is reported through 80 questionnaires. 3 rd sub-bullet – data on 6 of 3500 garments torn/damaged comes from 80 voluntary questionnaires.	It appears that quantitative information was drawn from a non-statistical, subjective, voluntary survey program. It would be helpful for utilities to have data that evaluates garment strength using standard statistical methods. ASTM tests such as Trapezoid or Elemendorf Tear, Mullen Burst, Tabor Abrasion, and Uniform Seam Strength would more scientific for comparisons of various textiles and garments.
2.2 (b)	4 th bullet – Garment and mop/wiper material appear to be similar. PVA mops and wipers are described (LaSalle comments Section 4.7.1) as exceptionally absorbent for both water and dirt.	Are the performance attributes of absorbency, particulate capture, and retaining properties of a PVA mop desirable for garments?
2.3 2.4	According to the responses from 80 voluntary questionnaire responses, PVA is “significantly cooler” than cloth.	As discussed in comments to Section 2.2 above, independent standardized heat-stress tests on PVA and existing garment types would be helpful in evaluating user acceptance.
2.5 (a)	1 st bullet – a reference to minimizing PCEs by stocking and donning new single-use garments.	Is there a significant frequency of these types of PCEs at Comanche Peak? Why isn't laundry monitoring resolving this problem as it has for other facilities?
2.5 (b)	Table 2-1 and the accompanying text conclude that PVA reduces the number of PCEs. It compares PCE activity for the Unit 2, cloth outage to PVA trial outage. PVA was determined a material factor in the 16 fewer PCEs on the trial outage.	If this analysis is relevant, what was the basis for the 37% reduction of 44 PCEs in the most recent Unit 1 outage? Standardized data should be presented. No data is offered which depicts the proportion of PVA use to total garment use nor in the difference in number of donnings for each outage. Also helpful would be information on differences in work scope (for these RWPs), and facility changes such as program improvements or improved radiological conditions.
2.5 (c)	4 th bullet – states that PVA particle pass-through will be similar for both cloth and PVA when wet.	The assumption made here is that PVA can maintain strength as well as cloth when wet. Such a claim is questionable for any non-woven disposable garment. Wet hazards also include perspiration (as described in Section 6.2.3 OVA PCE events). If PVA exhibits tensile or barrier weakness when wet, is it appropriate to use when perspiration is a predicted? The draft report provides no data on non-film PVA barrier performance when wet. It seems important to test fabrics for dry and wet particle pass-through.

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2.6	<p>1st bullet - a 100% switchover from cloth to PVA would produce substantial cost savings.</p> <p>The 2nd bullet and Section 7.2.1 dictates that garment life data will “significantly affect the cost profile.” 7.2.1 estimates a 30-wash life as typical for most facilities and the cost benefit calculations use this number. Section 5.3 mentions a 20-wash life for cotton lease garments.</p>	<p>Utilities actually have an average combined reject rate of .5% to .6% for cloth, translating to a coverall life of about 175 washings.</p> <p>By utilizing Table 7-8 of the report (correlation of reject rate to savings), it would appear on average, conversion to a PVA program will cost an additional \$40,000+ annually.</p> <p>Given the impact of this variable on the economic benefit, the report should seek to model more realistic reject rates.</p>
3.2	Process Description	<p>The service offered by ETI appears to be waste processing. 10 CFR 2001(a)(1) requires that waste be transferred only to authorized recipients. 10 CFR 2001(b) requires "a person must be specifically licensed to receive waste containing licensed material from other persons for [any purpose including treatment prior to disposal]." Is ETI in fact licensed to accept such waste or simply to process laundry and return it?</p> <p>What are the implications for utilities in the event of a license violation? 10 CFR 30.41(b)(5) requires that licensees transfer licensed material only to persons authorized by a specific license to receive it.</p> <p>Also, in the event of an unanticipated environmental problem with PVA in ETI's effluent, what is the utility's liability for any fines and remediation?</p>
4.0 4.1	<p>OREX is developing soluble products for other industrial and health markets. 4.1 states that they have successfully marketed to medical industries.</p>	<p>According to their 2001 Annual Report (released in February 2002), parent company Isolyser has ceased all marketing in healthcare and minimized further investment in degradable products. This occurred after Allegiance Healthcare pulled out of its 1999 PVA healthcare markets licensing agreement.</p>
4.4	<p>Test results of particle pass-through are provided by SGSUTC. Summarized results state that PVA and 100% cotton fabrics performed significantly better than 65/35 poly-cotton.</p>	<p>The data presented fails to reflect this. It appears PVA performed substantially worse (24% less reduction) than 65/35 on 3 micron pass-through, and slightly worse (1%) on average of all 3 particle sizes. PVA had 18% less reduction overall than 100% cotton.</p> <p>Were the cloth tests performed on new or washed fabrics? Washed garments generally provide better particle barriers. Synthetic-content garments perform better than all-cotton after washing.</p> <p>Because perspiration is an issue with protective garment use, the final report should include test data on wet fabrics for both strength and particle pass-through.</p>
4.7	<p>Concludes that PVA is an excellent candidate for mops and wipers.</p>	<p>EPRI should request formal test results of decontamination factors obtained with both PVA and traditional materials, tested in the field, side-by-side.</p> <p>Surface area measurements should be provided on the “E” and “B” type mop sections to assure equivalency.</p>

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5.2	<p>The questionnaire responses include 80 subjective opinions.</p> <p>Compiled data from the questionnaire is used throughout the report with conclusive interpretation.</p>	<p>The report derives and reports quantitative in statistical form when the survey fails to meet the basic requirements for statistical analysis.</p> <p>Informal, non-statistical survey results are helpful, but quantitative inferences should be prefaced with a statement of non-statistical measure.</p> <p>Besides the issue of a small and non-random sample population, two important factors in the acceptance of the survey data should be mentioned:</p> <ol style="list-style-type: none"> 1. PVA use was optional. Only people who were predisposed to adopting the product were included in the trial and this may have invited subjective bias for a favorable outcome. 2. Survey completion was voluntary. Workers who wore PVA without a satisfactory result are less likely than satisfied users to complete the survey. These workers are not likely to use PVA again and are now filtered from the user population for the remainder of the trial. <p>Ask the author to correct terms such as “98% of the workers” to “98% of those responding” and to remove all questionable quantitative analysis.</p> <p>These factors are important only because many of the report’s conclusions rely on the survey comments and the preponderance of quantitative data derived from them.</p>
5.3 (a)	<p>A section on launderable PVA is offered here and in several references elsewhere in the report.</p> <p>An evaluation is provided of a 100-garment wash test. Observations and conclusions on durability are offered by the author.</p>	<p>Why are discussions for a multi-use garment in a study focused on single-use “cradle-to-grave” concept? At a minimum, isolate discussion of this separate product to a single section. This will avoid any inadvertent confusion of product benefits between the one-use and multi-use.</p> <p>No independent lab tests were provided for the reusable fabric, new or washed, nor does a multiple wash-but-not-worn test provide sufficient data for such conclusions.</p>
5.3 (b)	<p>The multi-use garment discussion cites advantages of reduced radwaste and improved economics.</p>	<p>This conflicts with the advantages promoted for single-use PVA offering fewer clothing PCEs and fewer shipments.</p>
6.1	<p>Transfer canal work lessons learned resolves PCM alarms on exiting worker modesties by switching from PVA to paper on the outer layer.</p>	<p>This is the document’s only reference to other one-use (paper) garments as an alternative to PVA. Did Comanche use paper outers previously to avoid high contamination to their cloth or because double cloth did not provide an adequate barrier? This deserves clarification since it appears to be an admission that paper provides a better barrier than PVA.</p> <p>Did the RP group document PCEs on modesties in previous outages? If they had – and discontinued doing so this outage – it would skew the PCE comparisons.</p>

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6.2	Table 6-2 breaks out the body regions of the PVA user PCEs. Events other than contamination transition through the garment are omitted from the summary.	<p>Several worker comments cited fit and wear problems with disposable hoods. Most RP techs would agree that hood adjustments with contaminated gloves are a major contributor to facial contaminations.</p> <p>Why are facial contaminations excluded from the analysis without an assessment of whether hood design, fit, and comfort was causal?</p> <p>There is no discussion of the (14) cloth-protected PCEs. If they were hand or foot contaminations, it would be meaningful in the comparison to the PVA-protected personnel.</p>
6.3	Conclusions related to PCE	Refer to Section 2.5(b) comments regarding the non-standardized data analysis and factors that impact the aggregate numbers.
7.x	Economic Considerations	<p>In general, there are several variables which have a substantial impact on the economic calculations used in this report. They include:</p> <ul style="list-style-type: none"> • REJECT RATES: (addressed in Section 2.6 comments.) • RADWASTE COST: Currently competitive. Waste site operators are moving toward vertical integration into processing services traditionally performed by intermediaries. Net cost reductions of up to 15% are projected for direct shipments. Any declines in net radwaste fees would reduce the cost of the traditional cloth programs more than it does for PVA service. • PROCESS FEES: PVA fee structures seem tentative. This is a new process with many questions yet unanswered regarding effluent permits, federal licensing, operating costs, and capacity limits. This leaves some potential that the initial fees will require upward adjustment. • GARMENT COSTS: The same factors apply to the garment pricing. Isolyser’s latest annual report identifies risks in outsourced manufacture, import, product QC, and capacity limitations. Realization of any of these would result in immediate price changes, since Isolyser appears to be cash-poor and unable to absorb such costs. • OTHER OFFSITE SHIPMENTS: Sites have to either maintain inventories of rubber items or do frequent shipments to manage demand for these items. If they use disposable items, the radwaste issue must be addressed. <p>In summary, request some assurance from these vendors that they are confident in their pricing structures for the near future. EPRI members would invest heavily in conversion and therefore run a risk in switching to PVA under current cost assumptions. This would be especially important for facilities considering the capital investment of self-processing.</p>