

# OREX<sup>®</sup> Processing

## Questions and Answers

Special Edition

August 2010

### *What is OREX “PROCESSING”?*

OREX is processed under a **proprietary and patented** method, considered a “*decontamination*” process, and has been reviewed by the Nuclear Regulatory Commission (NRC) and licensed accordingly. The processing properties specific to OREX polyvinyl alcohol (PVA) products make the whole concept of “single use” programs technically and economically viable for the nuclear industry. The OREX process takes full advantage of the unique solubility properties of the PVA polymer.

- First, used OREX products are dissolved, converting them from a solid to a liquid form.
- Next, a filtration stage removes the radioactive contaminants.
- Lastly, the resulting solution is sampled and released to the environment in accordance with regulatory criteria. The released liquid is organic and biodegradable and eventually broken down to primarily carbon dioxide and water. These elements are returned to the environment for reuse.

### *Why is there an emphasis on OREX PVA “processing”?*

The OREX dissolution processing technology is an important key to the viability of the cradle-to-grave, one-time-use PVA protective clothing and consumable supply approach. From a radwaste minimization standpoint, it is the first new technology in years in an area that has been sorely longing for new technology. Individuals knowledgeable about radwaste processing and disposal understand that there is no guaranteed, long term, affordable access to disposal capacity. Incineration has become too expensive and is rarely done anymore. Waste volume reduction is limited typically to super compaction methods where possible. History, unfortunately, shows that a number of variables affect land burial options and what is viable today may not be viable tomorrow.



**ETI**   
**EASTERN TECHNOLOGIES, INC.**



*Website:*  
**www.orex.com**

***Who developed the OREX processing technology?***

The OREX product line was developed by individuals from the nuclear power industry who possess many years experience in radiation protection and radwaste management. Thus, OREX was developed “beginning with the end in mind.” The unique treatment process facilitates the use of single-use products without generating significant quantities of waste requiring disposal at a licensed radioactive waste burial site. This is good for our industry and our environment. Nuclear facilities are realizing significant benefits from this approach, not only in waste minimization but in worker comfort and protection and logistics improvements. Improved program performance is the bottom line!

***Do many OREX users take advantage of OREX processing technology?***

The majority of power plants using OREX do in fact, return the used items for processing. Over 5,000,000 pounds of OREX has been processed from 2003 through July, 2010. Most users find that the “cradle-to-grave” cost of using OREX and having it processed is comparable or more cost effective than existing scenarios in managing protective clothing programs. In addition to the more obvious key cost elements, OREX use and processing options offer many “less tangible” benefits not realized under traditional launderable garment scenarios. Benefits such as improved worker comfort, less heat stress, personnel contamination event reduction, simplified logistics, fewer shipments, ease of handling and peace of mind are just a few key benefits to an OREX program. Many power plants have performed these evaluations and have made the full transition to OREX and OREX processing and a growing list of users speaks for itself.

***Is OREX Processing considered “waste processing”?***

OREX Processing IS NOT technically considered “waste processing.” This is an important distinction due to the differences in regulatory requirements associated with waste processing versus a decontamination process. A typical nuclear laundry processing facility is only authorized to collect, launder and decontaminate contaminated clothing and other launderable non-apparel items. Generally, a nuclear laundry facility is not authorized to receive, possess, process or transfer for disposal radioactive waste, except that generated as a result of laundering activities, such as solid residue waste from the water treatment or air exhaust systems. However, during the regulatory review of OREX Processing it was concluded that zippers, in the case of dissolved disposable protective clothing, are more like residue from the laundry process and thus the NRC allows the processing facility to handle them as residual waste and send them directly for disposal as radioactive waste. Thus, like the conventional laundry process, OREX processing, which dissolves and decontaminates disposable protective clothing, does not constitute a waste receipt or treatment process. “Waste processing” is a different, specifically licensed activity that requires different manifesting documents, radioactivity accountability, etc.

***Where is OREX processed?***

OREX processing is done at either the Eastern Technologies, Inc. (ETI) facility located in Ashford, Alabama or the Impact Services processing facility at the ETTP site in Oak Ridge, Tennessee.

*“dissolving your problems through advanced technology”*

**The OREX<sup>TM</sup> Advantage**

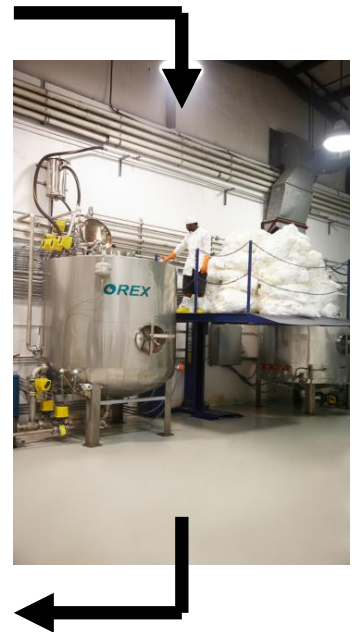
# BEFORE....

600 pounds of Used OREX



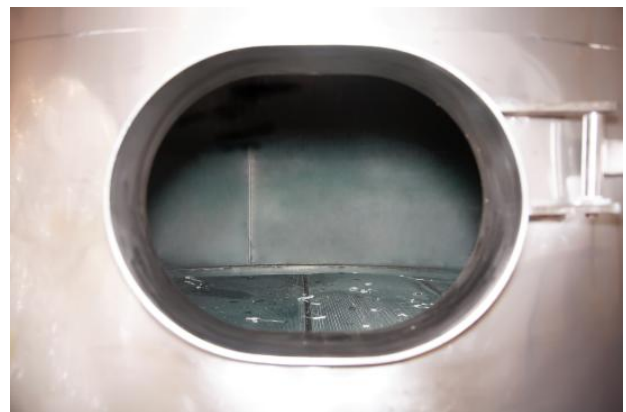
# Loading the Processor.....

OREX Bags and All Go In!



# A Few Hours Later.....

Nothing but Zippers and Non-Compatibles Remain!



***How much OREX material have you processed to date?***

Through July, 2010, over 5,000,000 pounds of used OREX material have been successfully processed at the ETI facility since commercial processing of OREX products commenced in early 2002.

***What is your capacity for processing OREX materials?***

The two machines at ETI's Alabama facility have a combined capacity of over 2,000,000 pounds per year. The Oak Ridge facility can currently process an additional 350,000 pounds per year. This equates to a total yearly capacity of around 3.5 million sets of protective clothing.

***Can we ship used OREX to either processing facility?***

Used OREX material will normally be processed in our facility in Alabama. For our customers in close proximity to Oakridge, it could be shipped to that facility for processing. All D.O.E. material will be processed at the Oakridge location.

***Has the OREX Process been specifically incorporated in the license for the ETI facility?***

Yes. Prior to commencing OREX processing, an amendment to the ETI license was issued by the State of Alabama. The Tennessee license also includes specific provisions to accommodate OREX processing. Additionally, the Nuclear Regulatory Commission reviewed how the OREX process was licensed by the State of Alabama and concluded that licensing the OREX process as a decontamination process was appropriate. These licenses, as well as other documentation supporting how the process is licensed, are available for review upon request.

***What happens to non-OREX materials?***

Non-OREX materials (e.g., trash, tape, tools, etc.) that are received in an OREX shipment are segregated and returned to the generator. There is no charge for sorting trash/waste in amounts 60 pounds in a given shipment. Non-compatibles in excess of 60 pounds are subject to a nominal (i.e., 50-cent/pound) fee. To the extent practical, ETI will attempt to send the waste back on a returning shipment to minimize additional shipping charges. Non-OREX material is normally removed prior to processing. But if such materials are introduced into the processor, they cause no negative operational impact and the nonconforming materials are simply removed from the processor at the completion of the cycle.

***What happens to the waste from OREX processing?***

Since OREX processing is considered a decontamination process, any residual waste from the process is considered "secondary or residual waste" and is handled by ETI as part of the quoted price. Secondary waste from processing of OREX products include zippers, hook and loop material, some thread, and the process filters. This waste is passed on to a licensed waste processor by ETI for final disposition. Secondary waste from processing of OREX material is neither returned nor reported to the generator, unless of course the generator requests return of these materials.



**Contact Us...****Eastern Technologies Inc**

Melissa Wright  
Or  
Cilem Rice  
Office: 334-899-4351  
E-mail:  
mwright@orex.com  
crice@orex.com

Doug Kay  
Office: 817.579.6739  
Mobile: 817.559.0506  
E-mail: dkay@orex.com

Benji McWaters  
Office: 334.899.4351  
Email: bmcwaters@orex.com

Ray McCullers  
Mobile: 334.796.2013  
E-mail: rmccullers@orex.com

***Do we need to segregate wet OREX material for shipment to ETI?***

No. Bear in mind that OREX sent to the OREX processing facility need NOT meet a typical “waste acceptance criteria” or “WAC” which would typically contain some maximum “moisture content” criteria. As long as the material will meet DOT shipping requirements then ETI will legitimately process damp or wet material at no additional cost.

***Since OREX products are typically used one time and disposed of, should used OREX products be transferred and manifested as waste per the requirements of 10 CFR 20, Part 20.2006 and Appendix G?***

No. The key to answering this question again lies in the fact that the OREX process is licensed as a decontamination process. Since it is a decontamination process, the used materials need not be transferred and manifested as waste. This is supported by 10 CFR 20, Appendix G. Appendix G defines a Decontamination Facility as follows: “A facility operating under a Commission or Agreement State license whose principal purpose is decontamination of equipment or materials to accomplish recycle, reuse, or other waste management objectives, and, for purposes of this part, is not considered to be a consignee for LLW shipments.”

This provides significant benefit to users because launderable products, such as gloves, shoes, and fire retardant coveralls may be commingled in the same container and shipped to ETI as “radioactive material” rather than waste.

***Can ETI process other PVA materials or products?***

The OREX products were designed specifically for compatibility with the OREX Processing system and are “Certified Soluble™”. While the OREX processing system is capable of dissolving other PVA products, we would need to examine and test other products to ensure compatibility with the OREX processing system prior to agreeing to process it.

***Can other vendors process used OREX materials or products?***

Eastern Technologies Inc. owns the license and patents associated with PVA processing technologies which allow us to truly and effectively treat PVA products on the back end. ETI is the only vendor authorized to offer this process to the nuclear power industry. The OREX and PVA processing technology we employ is unique, patented and cannot be replicated by anyone.

Licensed waste processing facilities are capable of processing OREX using conventional waste processing and volume reduction methods, such as incineration, compaction, etc. However, we believe that single use protective clothing programs that do not mitigate waste generation may be short-sighted. Only the pat-

**Website:**  
**[www.orex.com](http://www.orex.com)**