



# FAQ's

## **What is OREX?**

OREX is the trade name for a new line of products engineered specifically for the nuclear industry. OREX products are manufactured from a special, degradable polymer that is environmentally friendly. Following use, the used products are treated offsite using a proprietary process that dissolves the product in high temperature water (> 190 degrees F.), decontaminates it and ultimately chemically converts it to carbon dioxide and water, much of which is returned to the environment for reuse. Radioactivity is removed during the treatment process and is collected on filters for subsequent handling and proper disposal as radioactive waste. This process eliminates waste. This means an entire 20' long sea-land container full of used OREX materials can be ultimately placed in a 1-gallon container.

## **What OREX Certified Soluble products are currently available?**

Currently, the OREX Protective Clothing line includes standard coveralls, hoods, booties, and hard hat covers. Additionally, there are splash resistant coveralls and booties, multiple dosimetry coveralls, lab coats, and scrub/modesty garments. Several consumable products are also available including ice vests, mops, OREX waste bags, wire-tie dosimetry bags, spill socks and rolls of sheeting. Several new products are always in development.

## **What sizes of OREX coveralls are available?**

OREX coveralls come in the following sizes: Medium, Large, X-Large, 2X-Large, 3X-Large and 4X-Large. OREX coveralls tend to run larger in size than conventional cotton or poly/cotton blend garments. OREX garments are new each time they are worn whereas other garments may have been laundered a number of times prior to wearing them. Launderable garments typically shrink about 20% and this creates the size difference between OREX and traditional coveralls. For example, a size "Large" in a traditional laundered garment might be about the same size as a "Medium" OREX coverall. OREX scrubs/modesty garments come in sizes Small through 3X-Large.

## **What about other protective clothing, such as rubber gloves and shoe covers?**

The standard rubber gloves and shoe covers will most often be used with OREX.

## **What are the benefits of OREX products?**

OREX clothing is most noted for its light weight and comfort. The garments are breathable and tend to reduce heat stress. A full OREX dressout (coverall, booties and hood) weighs 70% less than traditional cloth garments. Since OREX is much lighter in weight, the risk of injury associated with protective clothing handling is reduced. OREX usage is expected to provide numerous other benefits to the plant including reduced numbers of laundry shipments during outages and improved economics over current approaches. It is also interesting to note that most plants which have converted to OREX are reporting significant reductions in personnel contamination events. This is believed to be attributed to elimination of contamination events that have historically come from the residual contamination present in laundered protective clothing.

## **When will OREX clothing be worn?**

OREX will be used in place of conventional cotton coveralls and launderable hoods and booties. It may be also be used as an outer layer to replace paper suits in some cases. Radiation Protection personnel, plant procedures, or RWP's will provide instructions on when, where and how to dress using the OREX products.

## **OREX looks a lot like a white paper suit. How does it compare?**

OREX is more "breathable" than conventional paper suits, so it tends to be much more comfortable to wear. However, standard OREX clothing was designed as a substitute for traditional cotton and poly/cotton blend fabric protective clothing. Like cloth fabrics, OREX is not intended to provide an absolute barrier to contaminants. In cases where a superior barrier is needed, such as very high contamination areas or wet work, the specially treated splash resistant OREX "Deluxe" coverall may be used as a substitute for paper or water repellent coveralls. While the splash resistant OREX coveralls offer superior barrier properties similar to other paper or splash resistant products, it still breathes significantly better than those products. Plant specifics and experience will determine the best applications for OREX.

## **How durable are the OREX products?**

Although the OREX products are extremely lightweight, they are very durable. OREX clothing has been used at many nuclear stations for all sorts of activities including scaffolding installation, steam generator platform work, reactor head disassembly/reassembly, refuel cavity decontamination, drywell entries, shielding installation, fuel transfer canal work, etc. Very few instances of ripping or tearing have been reported.

## **How do OREX garments perform in a wet environment? Are they waterproof?**

The standard OREX clothing will absorb moisture in a fashion similar to a cotton garment. Standard OREX is not recommended for "wet" contamination type work. Also, during hot and humid work conditions, OREX will become sweat-soaked and will not "breathe" as well as a dry garment.

### **Are OREX products with a liquid protection barrier available?**

Yes, the "Deluxe" OREX coverall and booties are specially treated for water resistance. While they are not completely water proof, the Deluxe OREX products are suitable for work involving incidental exposure to water or in damp environments. The Deluxe OREX products also provide superior barrier properties for very high levels of dry contamination.

### **Can the product be manufactured in different colors?**

Currently, most OREX products are "white" for various reasons. First, it should make field segregation and radworker training easier since most clothing today is "yellow". Second, most dyes are not easily processed in our treatment system due to the inorganic constituents present in such dyes. So we try to avoid using dyes during manufacturing. OREX scrubs and modesty garments are "teal" colored. This was done to create an opaque fabric for "modesty" purposes. Additionally, the Deluxe OREX Coveralls are manufactured with a yellow zipper to allow for easier identification relative to the standard OREX coveralls.

### **What about discrete radioactive particle (hot particle) pass-through properties of the OREX clothing?**

At first glance, OREX fabric appears to provide limited protective potential because of its "sheerness". The interesting fact is that the actual fiber that makes up the fabric is clear! This gives the fabric a less substantial appearance when coupled with its lightweight nature. Due to light diffraction it appears to be "white". There is no standard test method to determine particulate pass-through properties in a quantitative manner truly representative of field conditions. However both lab testing and actual field experience in contaminated areas indicates that OREX fabric is at least as good, if not a better barrier than an industry standard cotton or poly/cotton blend garment. Additionally, the fabric is static free and thus will not attract charged "fuel-type" particulates or Radon-222 daughter products.

### **Will the OREX clothing dissolve if I am sprayed with hot water?**

During processing, OREX only begins to breakdown and dissolve under prolonged immersion or contact with very hot water (>190°F). Incidental contact with hot water WILL NOT affect the properties or integrity of the garments.

### **What about "hot work"? Is OREX flame retardant?**

OREX protective clothing is rated Class I – Normal Flammability by the Consumer Product Safety Commission regulations of 16 CFR 1610-1998. This is equivalent to traditional protective clothing currently used by the industry. This means it is generally acceptable to wear under normal work situations. Remember, OREX is a suitable substitute for traditional cotton or poly/cotton blend protective apparel and can be worn in applications acceptable for traditional garments. However, like most standard cloth protective clothing, OREX is NOT "fire retardant" and specially treated fabrics or special garments should be considered instead for "hot work" in which sparks or welding is involved.

### **As a Radworker, what do I do with the OREX products following use?**

Plant procedures may vary. All OREX products should be placed in the laundry receptacles at the undress locations or step-off pads along with all traditional, yellow, launderable products. Our licensed OREX processing vendor, Eastern Technologies, Inc (ETI), will segregate the OREX products from the conventional launderable products. A centralized, U.S. OREX processing unit is located at the ETI laundry service facility.

### **What if the OREX products are damaged or cut? Should I put them in the trash instead of the laundry receptacle?**

Always put any OREX product in the laundry receptacles or receptacles identified for OREX use, regardless of whether it is damaged or cut? DO NOT put it in the trash receptacle because the trash is sent to a different vendor for processing. To achieve the maximum benefit of greater volume reduction associated with the OREX processing, the OREX products must always go in the laundry receptacles.

### **Are there any "lessons learned" regarding OREX that I should know as a radworker?**

Some plants have reported problems with the zipper slide or pull tab becoming detached from the zipper. Although the number of occurrences of this has been extremely small, OREX Technologies has implemented improvements to the zipper to preclude this from occurring. However, during the investigation of these reports, it was discovered that the problem primarily occurs during the undress sequence when some workers "rip" the front of the coveralls open versus unzipping them. Radworkers should be aware of this and ensure they undress using proper techniques.

### **What about used OREX mops and wipes? Should they go into a trash receptacle?**

No, DO NOT put any OREX in the trash receptacle because the trash goes to a different vendor for processing. To achieve the maximum benefit of greater volume reduction associated with the OREX processing, the OREX products must always go in the laundry receptacles. OREX products may all be combined and placed in one common receptacle.

### **What is the purpose of the double sleeve on the OREX coveralls?**

The double sleeve is designed to prevent use of tape or a closure device at the top of the glove. The inner sleeve is rolled down, the glove is put on over the inner sleeve, and the outer sleeve is rolled down on top of the glove cuff. This double sleeve design is very popular at many nuclear stations.

**Will tape or other non-OREX material cause a problem with processing?**

Although the use of tape is discouraged, a design feature in the processing unit simply ensures that any non-OREX materials will remain in the first stage of the process. The non-OREX materials are easily removed following processing and are returned to the plant as waste for disposal. OREX coverall zippers are processed by ETI as waste.

**Is there any previous experience with use of the OREX products?**

Use of OREX is widespread. OREX has been used at over 25 nuclear plants in the United States and has been the primary protective clothing for 2 Steam Generator replacement outages, 5 reactor vessel head replacement outages, and numerous refueling/maintenance outages. In 2003, over 600,000 dressouts were performed using OREX products. Feedback from OREX users has been very positive. No significant problems have been encountered.

