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## Demonstration of DeconGel™ at the Oak Ridge National Laboratory Building 2026

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### Challenge

In 2003 an area behind the hot cells in Building 2026 at the Oak Ridge National Laboratory (ORNL) was flooded with highly contaminated liquids when a liquid low level waste pipe became clogged. The main contaminants of concern are uranium and plutonium. Transferrable contamination levels are in the 1,000,000 disintegrations per minute range. The area is posted as an airborne contamination area requiring double anti-contamination suiting and full-face respirators for entry. In the years since the accident, the area has been painted, lacquered, and treated with InstaCote™ CC Wet to reduce airborne and transferrable contamination.



### Technical Solution

Cellular Bioengineering Inc. (CBI) has developed decontamination gels (DeconGel™ 1101, 1120 and 1121) that when dried allow efficient removal of contamination from surfaces in a peelable film that can be easily disposed. The gels are recommended for decontamination of radioisotopes as well as particulates, heavy metals, water soluble and insoluble organic compounds (including tritiated compounds). The hydrogel coating can be applied to horizontal, vertical and inverted surfaces and can be applied to most substrates including bare, coated and painted concrete, aluminum, steel, lead, rubber, plexiglass, herculite, wood, porcelain, tile grout, and vinyl, ceramic and linoleum floor tiles. When dry, the product locks the contaminants into a polymer matrix. The film containing the encapsulated contamination can then be peeled and disposed of according to appropriate local, state and federal regulations.

Previous DOE sponsored field tests included the decontamination of Pu-238 in highly contaminated glove boxes with DeconGel™ at Lawrence Livermore National Laboratories. Surfaces decontaminated included aluminum, cast steel and Lexan (polycarbonate) windows. The average decontamination efficiency after three applications was 99+% and the gel shielded 91+% of the radiation during drying. Given the highly contaminated nature of the glove boxes, the decontamination efficiency was considered excellent and it was estimated that a significant savings in man hours was realized.



A second field test included the decontamination of multiple surfaces with DeconGel™ at Alaron Nuclear Services. The average reduction in loose beta activity was 90-100%. Isotopes decontaminated include Cs-137, Cs-134, Co-58, Co-60, Mn-54, Fe-55, Ni-63, Ni-59, Zn-65, Zr-95, U-238, U-234, U-235, Ag-110m, Zn-65 and Sr-90. Highlights of single applications include: a 90% reduction of loose beta contamination on the cylindrical surface of a Nuclear Assurance Corporation (NAC) National Lead Industry (NLI) storage cask, a 98% reduction of loose beta contamination on the soiled cap of an NAC NLI storage cask and a 99% reduction of loose beta contamination on the bare concrete floor of the heavily used contaminated area.

<b>Site Project &amp; Identifier</b>
D&D Toolbox – ORNL Decontamination Agent Demonstration

<b>Tech Stage:</b>
<i>Demonstration</i>
Demonstration of decontamination agent at ORNL Building 2026

**Tech Accomplishment**

Through a grant between the Department of Energy Office of Environmental Management and CBI and managed by the Office of Deactivation and Decommission and Facility Engineering (EM-23), the CBI gels were tested at ORNL. DeconGel™ 1101 was applied to a 20' by 30' contaminated area on the floor and tracks behind the hot cells in Building 2026 and DeconGel™ 1121 was sprayed and painted on the walls and hot cell doors up to about 2' in the same area. The initial application removed an average of about 50% of the alpha and beta transferrable contamination. Areas that had not been previously treated with sealants or fixatives showed removal efficiencies greater than 90% - as did some of the floor areas. It is hypothesized that in areas of lower removal efficiency the DeconGel™ removed the previous treatment materials but was not able to fully penetrate into the porous surfaces of the concrete because of the previous treatment processes. The tracks contained accumulated treatment material and some debris. It is believed that the DeconGel™ pulled up this material and exposed the underlying contamination. Therefore a second application of DeconGel™ 1101 was made to the tracks. Analytical results showed additional removal of about 62% of the transferrable alpha contamination and 37% removal of transferrable beta contamination. The role previous treatment processes played in this field test, as it relates to the efficacy of the tested gels, is still unclear.



**Impact**

Decontamination agents can be an effective means of reducing or eliminating contamination on building surfaces and equipment. This technology improves worker safety and reduces personnel protection equipment requirements. Decontamination prior to D&D can also reduce the volume of contaminated debris going into radiological landfills, saving on landfill space and disposal costs. Decontamination agents also have the potential to reduce the cost and accelerate the schedule for D&D by reducing contamination control and monitoring requirements before and during D&D.

**Impact and Features**

- Allow for down posting of contaminant areas thus reducing cost to maintain
- Improve worker safety
- Reduce personnel protective equipment requirements
- Reduce the volume of contaminated debris and equipment slated for radiological landfills
- Reduce the cost of waste disposal by reducing radiological disposal and utilizing sanitary industrial disposal options
- Allow free release and reuse of equipment and facilities
- Accelerate the D&D schedule

**Vendor Information**

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**Technology Name:**

Decontamination agent

**Federal End User Info.**

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**Web Links:**

[www.decongell.com/information.html](http://www.decongell.com/information.html)

Challenge Category	Tech Solution Category
<ul style="list-style-type: none"> <li>• Contaminant Migration Control</li> <li>• Facility Stabilization</li> <li>• Secondary Waste Reduction</li> </ul>	<ul style="list-style-type: none"> <li>• Decontamination</li> <li>• Fixatives, coatings, &amp; encapsulation</li> </ul>