



# Transportation of Fresh MOX Fuel under Project Parallax: *Los Alamos, New Mexico to Chalk River, Ontario, Canada*

## Project Description

One of several options being considered by the United States (U.S.) and the Russian Federation (R.F.) for the disposition of excess plutonium from dismantled weapons is to convert it to mixed oxide (MOX) fuel for utilization in Canadian power (CANDU) reactors. Presently, the U.S. Department of Energy is participating in a demonstration project called Parallax (for parallel experiment) that involves production of laboratory quantities of MOX fuel, using plutonium from disassembled weapons, at the Los Alamos National Laboratory (LANL) in the United States and at the Bochvar Institute in the Russian Federation. The objective of the Parallax Project is to simultaneously irradiate test quantities of U.S. and R.F. MOX fuel in a test reactor under burnup and heat generation rates representing those expected in the CANDU reactors. The irradiation is scheduled to begin in late 1998 in the pressurized loops of the National Research Universal (NRU) test reactor at the Atomic Energy of Canada Ltd. (AECL) Chalk River Laboratories (CRL). The Parallax Project will demonstrate many parts of the mission of this disposition option: fabrication of MOX fuel pellets, assembly of fuel elements and bundles, shipment to a reactor, irradiation, and post-irradiation examination. This fact sheet describes key aspects of the transportation of the fresh (unirradiated) MOX fuel elements from LANL to CRL.

## Transportation Packaging

MOX fuel consists of sintered oxide pellets encased in Zircaloy-4 metal cladding that form sealed fuel elements (shown at left). The MOX fuel produced at LANL will be loaded into an AECL Model 4H shipping package. The Model 4H package, shown below, was designed by AECL and this design was certified by the Canadian Atomic Energy Control Board (AECB) as a Type B(U)F package in accordance with Canadian and International Atomic Energy Agency (IAEA) regulations. The U.S. Department of Transportation (DOT) has also endorsed the package design and the use of the package. The Model 4H was specifically designed and tested to withstand the routine, normal, and accident conditions of transport including conditions of impact, puncture, water immersion, and fire.



## Environmental Assessment

In compliance with the National Environmental Policy Act (NEPA) that requires all federal agencies to consider the environmental consequences of proposed actions before decisions are made, LANL developed a draft Environmental Assessment (EA) which DOE issued for public review and comment in August 1997. The EA evaluates the environmental consequences of transporting MOX fuel from LANL to CRL. Once the EA is finalized and if the Proposed Action has been determined to have no significant impact, DOE will be able to proceed with the activity. DOE will then apply to the Nuclear Regulatory Commission (NRC) for a license to export the MOX to Canada. Given that an approved Type B(U)F container is to be used for the transport, the AECB does not require any specific environmental assessment of the Parallax shipments. The AECB is reviewing the Parallax Project to assess compliance with the existing CRL site license, the granting of which included an environmental assessment of the cumulative effects of all the activities conducted at CRL.



## Transportation Planning

Oak Ridge National Laboratory (ORNL) provides overall management of the Parallax Project for DOE. Despite the relatively small quantity of material, DOE has declared that the transport of Parallax MOX fuel from LANL to CRL will be regarded as a "high visibility" shipment, due to the public interest that has been expressed. As such, DOE directed ORNL to develop a "Transportation Plan" for Parallax shipments, in compliance with DOE Orders. The Transportation Plan outlines responsibilities of the organizations involved in the shipment, and provides a comprehensive description of all aspects of the shipment.

## Route Selection

Although the quantity of radioactive material is well below the level that which would require a specific transportation route to be dictated, DOE has taken great care to ensure that the potential routes are chosen to minimize public risks, as prescribed in the DOT regulations. The EA analyzed three possible routes. Final route selection will be

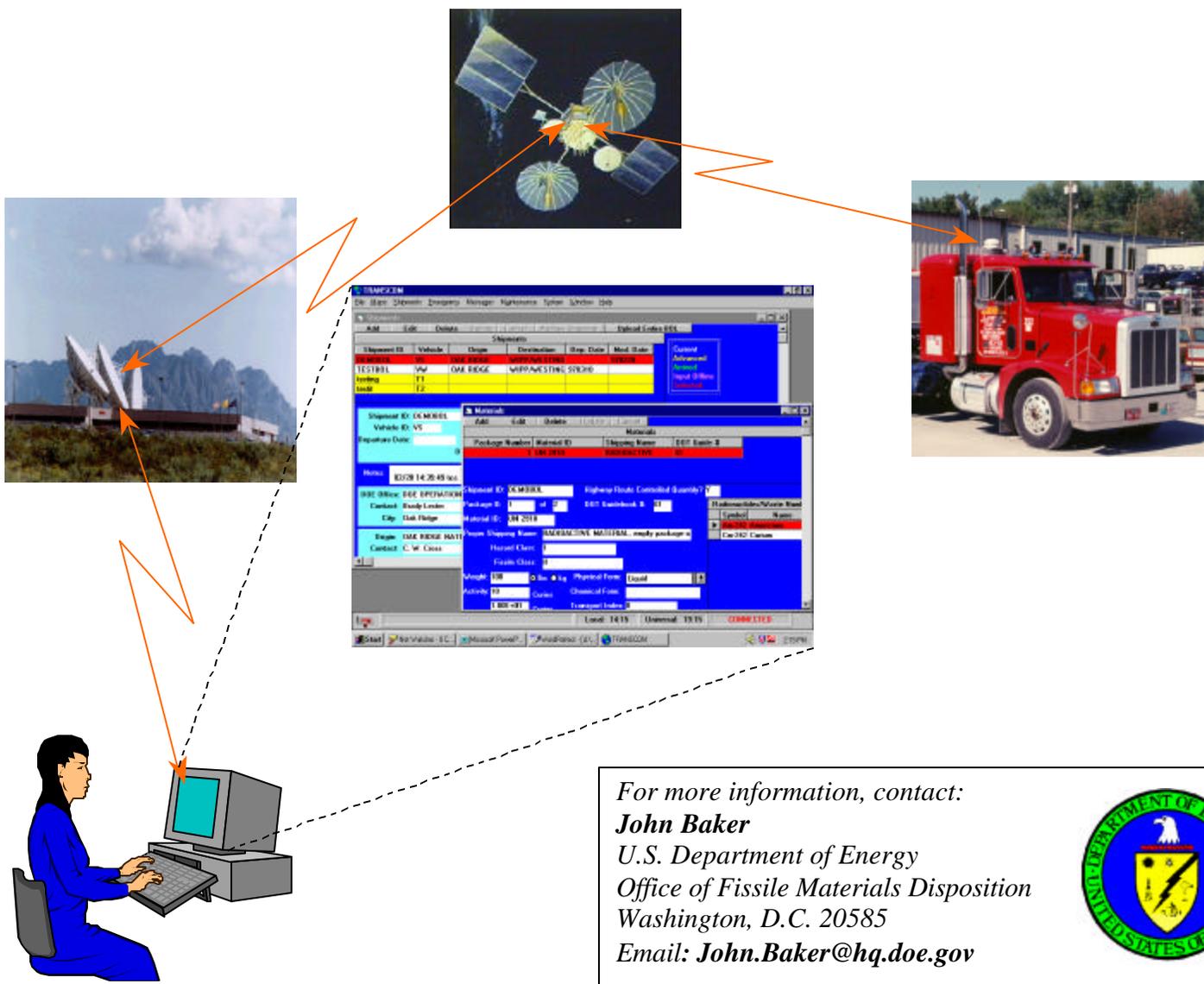
made prior to shipment by DOE, and, along with the shipment schedule, will not be publicized to provide shipment security in transit.

## Carrier Selection

LANL will arrange for the MOX fuel shipment by selecting a motor carrier using DOE's Motor Carrier Evaluation Program (MCEP). With MCEP, DOE reviews a carrier's safety record, insurance, emergency response capabilities, hazardous materials shipping experience, equipment maintenance, driver qualifications, and driver training. From this information, a qualified carrier can be selected. The carrier selected will follow instructions in the Transportation Plan, obtain all required permits, and arrange for required vehicle inspections along the route.

## Shipment Tracking

The MOX fuel shipment will be tracked by DOE's computerized satellite tracking/communication system called TRANSCOM. This 24-hour tracking and two-way communication system, depicted graphically below, is operated by DOE in Oak Ridge, Tennessee. It can monitor all movements of spent nuclear fuel, high-level waste, and other shipments that have been designated as "high visibility" by DOE. The TRANSCOM Control Center, in addition to monitoring the shipment progress, can also help coordinate the actions of emergency response in the unlikely event of an accident. Authorized users, using personal computers with modems and specialized software, can dial into TRANSCOM and get information about the MOX fuel shipment before departure and during transit. Information available to authorized users includes schedule, planned routes, and information found on shipping papers. Using TRANSCOM, DOE is afforded an increased level of safety and control of the shipment, and can expeditiously meet its added responsibilities in communicating with external stakeholders.



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