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SUMMARY PAPER

SHIELDED CANISTER TRANSPORTER

Gene G. Eidem Jr. and Robert Fages

Fluor Daniel-Advanced Technology Business Unit

INTRODUCTION

The Hanford Waste Vitrification Plant (HWVP) will produce canisters filled with high-level radioactive waste immobilized in borosilicate glass. A Shielded Canister Transporter (SCT) will provide the means for safe transportation and handling of the canisters from the Vitrification Building to the Canister Storage Building (CSB). The stainless steel canisters are 0.61 meters in diameter, 3.0 meters tall, and weigh approximately 2,135 kilograms, with a maximum exterior surface dose rate of 90,000 R/hr. The canisters are placed into storage tubes to a maximum of three tall (two for overpack canisters) with an impact limiter placed at the tube bottom and between each canister. A floor plug seals the top of the storage tube at the operating floor level of the CSB.

DESCRIPTION OF WORK

The SCT conceptual design considered the necessary functions, operations, safety features, design criteria, human factors, serviceability requirements, and maintenance philosophy. Six significantly different alternative machine concepts were considered of which three were eliminated because of operational undesirability. The three remaining concepts appeared feasible and were studied in depth. The selected conceptual design will be used to develop a detail design.

The primary considerations/factors for design of the SCT are as follows;

a. The biological shielding of the cask must provide adequate protection for the on-board SCT operator.

b. The total weight of the vehicle cannot exceed 147,700 Kg due to the structural constraints of the CSB Floor.

c. The SCT cask must incorporate a self contained on-board ventilation system to eliminate the possibility of leakage of radioactive material into the atmosphere due to residual surface contamination while in the traveling mode and during loading/unloading operations in the CSB.

d. The vehicle power source must utilize a "clean" fuel to be compatible with the CSB HVAC system.

e. The vehicle must contain a number of monitoring devices and safety interlocks to ensure safe operation.

f. The vehicle must handle overpack canisters (damaged canisters that are placed into an additional container for disposal).

RESULTS

The study recommends the following conceptual design:

* The SCT will be a 147,000 Kg maximum gross weight vehicle with four-wheel drive controlled by a single on board operator. There will be two tires per wheel. The gross vehicle weight includes carrying an overpacked canister with a weight not to exceed 3,700 Kg, and a floor plug which will not exceed 5,000 Kg.
* The SCT will include a 83,700 Kg. tungsten cask which provides biological shielding for an operator in the cab and personnel next to the vehicle. Radiation doses with a radioactive canister in the cask

will not exceed 0.2 mrem/hr in the cab and 50 mrem/hr on accessible surfaces of the cask as a combined dose rate due to both gamma and neutron radiation.

* Twin, redundant vehicle energy systems, one active and one standby, will be driven by internal combustion engines fueled by propane.
* The drive, steering, and cask lift/lower systems will be hydraulically powered. All other handling functions will be electro-mechanical.
* Load handling operations will be semi-automatic using programmable logic controllers (PLC) with backup manual override available through keylock control.
* The cask will provide confinement of canisters, floor plugs, and impact absorbers during handling and transport.
* The cask will include a shield valve which is also part of the confinement system for a canister in the cask. The shield valve control system will be force limited to preclude damaging a canister during any failure condition.
* A confinement ventilation system will be provided for the canister and plug cavities in the cask. Air flow direction will be controlled during load handling operations over an opened storage cavity. A separate HVAC system exists for the cab.
* The transporter will be capable of completing three missions in 8 hours. A mission consists of picking up a canister at the transfer tunnel in the Vitrification Building, driving to the CSB, depositing it in a storage tube, then return.
* The SCT will be a non-safety class item. Certain requirements exist for the braking system, the shield valve and cask drive systems, the

center of gravity of the vehicle, and the engine throttle failure modes to ensure that the SCT meets safety criteria.

* The SCT will utilize a total of 4 CCTV cameras, 3 with zoom lenses and one with a fixed focal length for observation and positioning the vehicle cask and canister. The positioning system consists of a CCTV and an optical gauging system which commands the cask positioners through a PLC. Manual override control is available through keylock joystick control.
* An on board fire suppression system will be provided.
* The SCT will be capable of depositing impact absorbers into CSB tubes using a special grapple.

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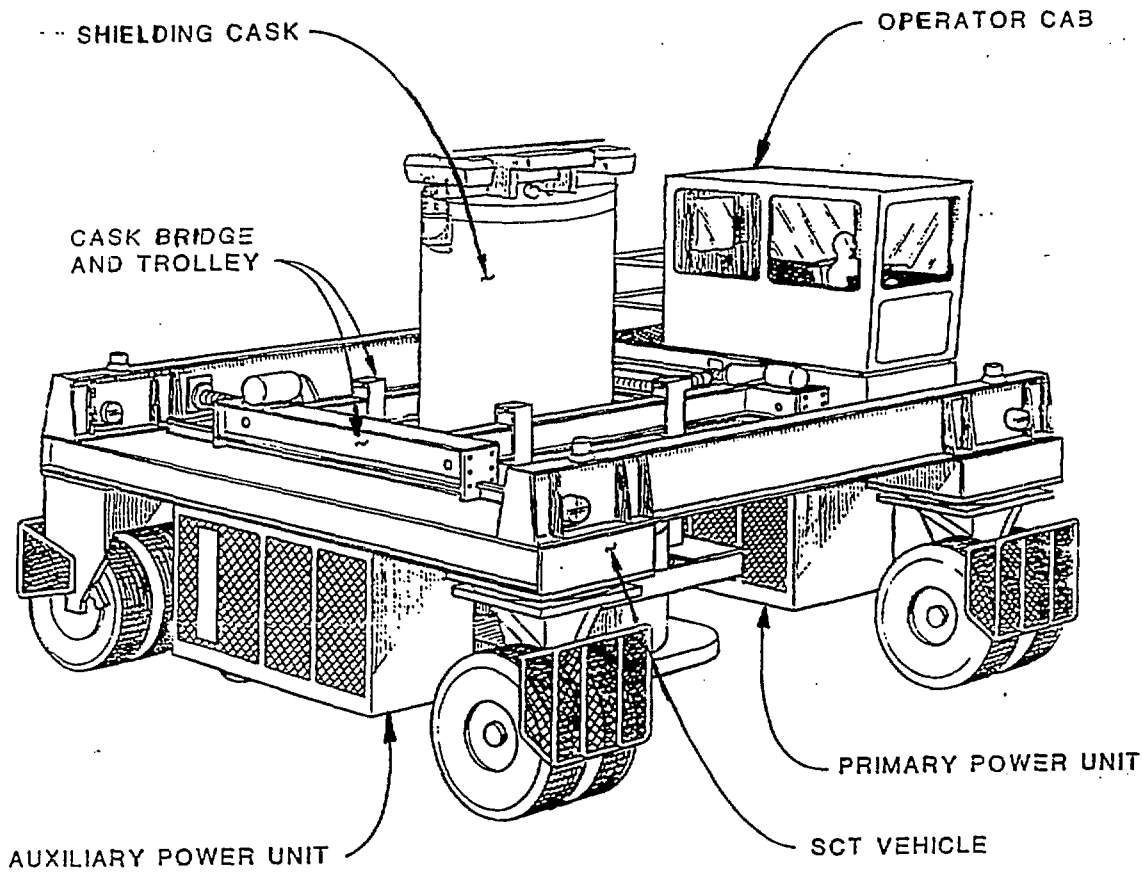

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