



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
611 RYAN PLAZA DRIVE, SUITE 400  
ARLINGTON, TEXAS 76011-8064**

June 29, 2001

Ms. Laura J. Davis  
Director of Environmental, Health & Safety  
Ball Aerospace & Technologies Corp.  
9675 West 108<sup>th</sup> Circle  
Westminster, Colorado 80021

**SUBJECT: TERMINATED LICENSE REVIEW**

Dear Ms. Davis:

On June 26, 2001, the NRC concluded its review of a terminated byproduct materials license previously issued to Ball Brothers Research Corporation (BBRC) of Boulder, Colorado. Details of this technical review are provided in the enclosure to this letter. In summary, BBRC was licensed by the U.S. Atomic Energy Commission (AEC) to possess any byproduct material in sealed source form as well as iron-55 and cesium-137 in loose form for use in instrument development and calibration.

AEC Byproduct Materials License 05-07977-01 was active between 1961-1968. The docket file records did not provide adequate disposition information for the radioactive material possessed under this license. As a result, the NRC conducted an independent review of this license docket file.

The responsibility for the review of this docket file is shared between the NRC and the State of Colorado. Two locations of use were listed in the license; the main office at the Boulder Industrial Park in Colorado and Cape Kennedy Air Force Station in Florida. The NRC's review did not specifically include the Colorado site because it is located within an Agreement State.

Based on our technical review, we have determined that BBRC obtained a number of small sealed sources from Goddard Space Flight Center during the 1960's. Most of the sources were returned to Goddard Space Flight Center and subsequently disposed as radioactive waste, launched into orbit, or kept by BBRC under its State of Colorado license. BBRC may have obtained sources from other licensees, but there was no documentation to this effect.

Disposition information was not obtained for every source possessed by BBRC, but all sources were most likely properly handled in accordance with regulatory or license requirements in effect at that time. Disposition information was obtained for all higher activity sources possessed with activities in the millicurie range. Since all available records have been located and since the higher activity sealed sources have been accounted for, this concludes our review of this terminated byproduct material file.

Ms. Laura J. Davis

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If you have any questions concerning this letter, please contact D. Blair Spitzberg, Ph.D., Chief, Fuel Cycle & Decommissioning Branch, at (817) 860-8191 or Mr. Robert Evans, Health Physicist, at (817) 860-8234.

Sincerely,

*/RA/*

Dwight D. Chamberlain, Director  
Division of Nuclear Materials Safety

Docket No.: None  
License No.: 05-07977-01 (expired)

Enclosure:  
Terminated License Status Report

cc w/enclosure:  
Colorado Radiation Control Program Director

Ms. Laura J. Davis

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bcc w/enclosure (ADAMS E-mail distribution):

EWMerschoff

DDChamberlain

LLHowell

CLCain

DBSpitzberg

RJEvans

JTBuckley, NMSS/DWM/DCB

MIS System

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DOCUMENT NAME: S:\DNMS\FCDB\RJE\10797701-status.wpd Final: r:\\_dnms\

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## ENCLOSURE

### Terminated License Status Report

Final ORNL Score: 8

Docket No. None

License No. 05-07977-01

Licensee Name: **Ball Brothers Research Corporation**

Mailing Address: Boulder Industrial Park  
Boulder, Colorado 80302

Site Name: Cape Kennedy Air Force Station, Florida

Site Address: Cape Kennedy Air Force Station, Florida

Regional Contact: Robert Evans, PE, CHP, Health Physicist  
Decommissioning & Inspection Branch  
Division of Nuclear Materials Safety  
Region IV

#### Status Summary:

On December 28, 1961, the U.S. Atomic Energy Commission (AEC) issued Byproduct Materials License 05-07977-01 to Ball Brothers Research Corporation (BBRC) for possession of iron-55 and cesium-137 in any form for use in instrument calibrations. The locations of use were listed as Boulder Industrial Park and Cape Canaveral (later known as Cape Kennedy) Air Force Station.

Amendment 1 added strontium-90 to the license, while Amendment 2 added americium-241 to the license. Amendment 3 changed the list of authorized material from specific isotopes to "any byproduct material." Amendment 4 changed the list of authorized users. Finally, Amendment 5 dropped Cape Kennedy Air Force Station as a location of use. License 05-07977-01 expired on January 19, 1968.

By letter dated January 4, 1968, BBRC requested the AEC remove Cape Kennedy Air Force Station as an authorized location of use. In its letter, BBRC recommended a license condition that stated, "Byproduct material used at the Cape Kennedy Air Force Station must be transferred to the Goddard Space Flight Center License Number 19-5748-2." The AEC didn't accept the wording of the letter, but Amendment 5 of License 05-07977-01 dated January 19, 1968, dropped Cape Kennedy Air Force Station as an authorized location of use. There was insufficient evidence in the docket file to determine if BBRC actually transferred any radioactive material to the Goddard Space Flight Center (GSFC).

Colorado became an Agreement State on February 1, 1968. The NRC reviewer recently contacted the State of Colorado to determine if BBRC had applied for and received a State license. BBRC was issued State of Colorado Radioactive Materials License 05-07977-01, Amendment 6, on September 20, 1968. Amendment 6 was the first Colorado license amendment. All radioactive material previously possessed under AEC License 05-07977-01 (Amendment 5) was transferred to State of Colorado License 05-07977-01 (Amendment 6) at that time.

The NRC reviewer recently contacted the environmental health and safety director for Ball Aerospace & Technologies Corporation. Ball Aerospace & Technologies still possessed radioactive material under a State of Colorado license. The licensee conducted a review of its archived records for any information to supplement License 05-07977-01 docket file. The licensee was able to account for some, but not all, of the sources. Ball Aerospace & Technologies disposed of a number of sources during 1997 that were previously authorized under the AEC license and still possessed a strontium-90 source that was obtained during the 1960's. However, the licensee was unable to locate any record of radioactive material transfer to GSFC.

The NRC reviewer also contacted the GSFC which continues to possess radioactive material under NRC Materials License 19-05748-02. GSFC still has some material transfer records for the 1960's. GSFC used index cards to document the material transfers until 1968 when a bound log book inventory system was placed into service. GSFC later used a computerized accounting system. The records indicate that GSFC transferred 5 carbon-14, about 50 iron-55, 1 cobalt-57, 1 krypton-85, 2 strontium-90, 1 barium-133, once cerium-144, 4 radium-226, 1 plutonium-238, and 5 americium-241 sources to BBRC during the 1960's.

Of these sources, only three had radioactivity levels in the millicurie range. A 225-millicurie plutonium-238 source was transferred to BBRC during August 1966 but was returned during September 1967. (The NRC reviewer noted that AEC License 05-07977-01 did not allow possession of this source; therefore, possession must have been authorized by a different license in effect at the time.) A 1-millicurie americium-241 source was launched into orbit during June 1969. Finally, a 1-millicurie strontium-90 laboratory standard is still in the possession of Ball Aerospace & Technologies Corporation.

Although the GSFC's receipt records were incomplete, the records that exist, indicate that most sources were either launched into orbit or returned to GSFC and subsequently disposed as radioactive waste. GSFC continues to maintain these archived material disposition records under its NRC license.

The NRC reviewer noted that BBRC possessed more radioactive material than was accounted for by GSFC records. As examples, BBRC had received cesium-137, promethium-147, and americium-241 sources that were not listed in GSFC's transfer records. At least one of these sources came from GSFS.

The NRC reviewer obtained GSFC's archived files and noted that the licensee had received a violation during 1967 for its failure to maintain accurate material inventory records. GSFC implemented corrective actions at that time to improve its inventory recordkeeping system. GSFC also noted in its AEC violation response letter that it possessed about 750 sources at any given time, and it had possessed roughly 2,000 sources during the mid-1960's. Since GSFC had failed to keep accurate material inventory records during the 1960's, radioactive material could have been transferred to and from BBRC without being adequately documented. This could explain why BBRC had sources that were not listed in GSFC's archived transfer records.

In summary, the NRC recommends closure of this byproduct materials license docket file.

Material disposition records are being maintained by GSFC for most of the radioactive sources shipped to and received from BBRC. All higher activity sources with activities in the millicurie range have been accounted for. Finally, both BBRC/Ball Aerospace & Technology and GSFC have been continuously monitored by the AEC, State of Colorado, or NRC. Any material transfer discrepancies should have been identified and dispositioned during the respective inspections or licensing actions.