

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 040-06304

License No: SMB-0103 (Terminated)  
13-12285-01 (Terminated)


Licensee: AVCO Corporation

Location: Richmond, IN

Date: June 4-6, 1997

Inspectors: P. J. Lee, Ph.D., Radiation Specialist  
E. L. Kulzer, Radiation Specialist

Accompanied by: John Ruyack, Indiana State Department of Health (IDH)  
Rex Bowser, IDH  
Jane Smith, IDH

Approved By: B. L. Jorgensen, Chief   
Decommissioning Branch

## EXECUTIVE SUMMARY

### AVCO CORPORATION

NRC Inspection Report No. 040-06304/97001(DNMS)

The purpose of the inspection was to determine whether the facility, where former AVCO Corporation was located, was adequately decontaminated prior to terminating the license. The inspectors conducted independent radiation surveys, collected samples for laboratory radioanalyses in the facilities where the former licensee's activities had taken place, and interviewed personnel at the site.

Based on the results of this inspection, the NRC has determined that no radioactivity from licensed materials was distinguishable from background radiation. Therefore, NRC has no further regulatory interest in this Sanvo property.

Elevated levels of radioactivity were identified from naturally occurring radioisotopes of the uranium series, the thorium series and potassium-40 which were contained in coal/fly ash. The coal/fly ash was generated from the operation of on-site boilers from 1937 to 1989, and was widely distributed on the site.

## DETAILS

### 1. Background

The Nuclear Regulatory Commission (NRC) is conducting a review of terminated license files, with the support of a contractor, to identify potential cases where licensed activities may have been stopped without full and documented verification that any residual radioactivity met guidelines for unrestricted release.

Atomic Energy Commission (AEC) license No. 13-12285-01 was issued to AVCO Corporation on June 14, 1967, and expired on June 30, 1972. This license authorized the use of atomic numbers 1-83 to study the effects of radiation on electronic components at the licensee's facility in Richmond, Indiana. All products were reported to have been returned to the sender. A total of 0.02 Ci were authorized under this license. The former AVCO facility is now owned by Sanyo Corporation.

License No. STB-0103 was issued to AVCO on February 20, 1961, and expired on March 31, 1965. This license authorized the use of 1,000 pounds of depleted uranium (DU) and 50,000 pounds of 3% magnesium-thorium alloy. The license authorized forming, grinding and machining of the licensed material.

License No. SMB-0103 was issued on March 31, 1965, superceding STB-0103, and terminated on January 17, 1974. This license authorized the use of 500 pounds of natural uranium and 2,000 pounds of thorium. The thorium was used to manufacture missile components and the uranium was used for making shells. Welding, grinding and machining were authorized.

The license files did not document final surveys and disposition of materials for these terminated licenses.

### 2. Independent Measurements

The NRC inspector performed independent radiation surveys with G-M pancake detectors, micro-R meters, and gamma scintillation detectors (Attachment A).

The inspector surveyed about 10 percent of the floors and lower walls in the east and west buildings for alpha/beta activity (Attachment B). The results of the surveys indicated less than the minimum detectable activity (MDA), which is about 1000 dpm/100 cm<sup>2</sup> alpha/beta. Also, a total of 90 wipes were randomly collected from locations throughout the buildings.

The inspector conducted outside radiation surveys at the west end of the west building and at the north end of the east building. One area, extending from the west side of the boiler house out about 40 feet, showed elevated radiation levels from 15  $\mu$ R/h (4 nC/kg/h) to 22  $\mu$ R/h (6 nC/kg/h). A mound, extending from the west side of the fence line inward about 40 feet, showed elevated radiation levels



from 10  $\mu\text{R/h}$  (3 nC/kg/h) to 15  $\mu\text{R/h}$  (4 nC/kg/h). Also, outside the fence off the north end of the east building, elevated radiation levels from 17  $\mu\text{R/h}$  (4 nC/kg/h) to 30  $\mu\text{R/h}$  (8 nC/kg/h) were observed.

Direct radiation measurements were not capable of identifying the specific isotope(s) causing the elevated readings. Eight soil samples were collected for laboratory radio-analysis.

### 3. Results of Sample Analyses

Wipe samples from the building interiors were analyzed by a gas flow proportional counter (Gamma Products G-5000) and the results reported in disintegrations per minute per 100 square centimeters (dpm/100  $\text{cm}^2$ ). Analysis of the 90 wipes collected showed that the gross alpha/beta was less than the minimum detectable activity (MDA) which is 15 dpm/100  $\text{cm}^2$ . Based on the results of survey and wipe samples analyses, no contamination was distinguishable from the background in the buildings.

A high purity germanium detector was used for qualitative identification and quantitative determination of the contamination in the soils collected from the elevated areas. The results of areas with elevated readings are listed below:

#### (1) Boiler house area:

A soil sample collected from a location where an elevated reading of 22  $\mu\text{R/hr}$  was detected, contained  $11.2 \pm 1.2$  pCi/gram of natural thorium,  $12.2 \pm 1.2$  pCi/gram of natural uranium, and  $7.9 \pm 1.9$  pCi/gram of potassium-40.

#### (2) West end mound area:

A soil sample collected from a location where an elevated reading of 15  $\mu\text{R/hr}$  was detected, contained  $6.1 \pm 0.8$  pCi/gram of natural thorium,  $6.6 \pm 1.0$  pCi/gram of natural uranium, and  $16.3 \pm 2.9$  pCi/gram of potassium-40.

#### (3) North end area:

Three soil samples collected from locations where elevated readings of about 20  $\mu\text{R/hr}$  were detected, contained  $9.4 \pm 1.1$ ,  $6.2 \pm 0.8$ , and  $9.8 \pm 1.1$  pCi/gram of natural thorium. The same samples contained  $13.5 \pm 1.4$ ,  $7.2 \pm 1.1$ , and  $9.8 \pm 1.2$  pCi/gram of natural uranium respectively, and  $15.4 \pm 2.8$ ,  $11.8 \pm 2.6$ ,  $10.9 \pm 2.3$  pCi/gram of potassium-40.

Three soil samples, collected from locations where elevated readings of about 30 uR/hr were detected, contained  $13.2 \pm 1.0$ ,  $13.8 \pm 1.2$ , and  $15.5 \pm 1.3$  pCi/gram of natural thorium. The same samples contained  $13.9 \pm 0.8$ ,  $14.9 \pm 1.2$ , and  $16.2 \pm 1.3$  pCi/gram of natural uranium respectively, and  $7.5 \pm 0.6$ ,  $8.4 \pm 1.6$ , and  $10.0 \pm 1.8$  pCi/gram of potassium-40.

Both the natural thorium (Th-232 + Th-228) and natural uranium (U-238 + U-234) discussed above were with daughters present and in equilibrium.

Based on the above results of soil sample analyses and interviews of personnel, the source of radiological contamination detected on the site was determined to be the coal/fly ash generated from the operation of the onsite boilers from 1937 to 1989.

4. Conclusions

No residual radioactive contamination was found which resulted from formerly-licensed activities. The Nuclear Regulatory Commission has no further regulatory interest in the Sanyo property at 1751 Sheridan Street in Richmond, Indiana.

5. EXIT MEETING

At the conclusion of the onsite inspection on June 6, 1997, the preliminary results of the inspection were discussed with the individuals identified below.

Partial List of Persons Contacted

- \*C. Maurer, Property Manager, Sanyo N. America Corp.
- \*J. Ruyack, Division Director, ISDH
- \*R. Bowser, Emergency Response Coord., ISDH
- \*J. Smith, Radiochemistry Lab, ISDH

\*Attended onsite exit meeting conducted June 6, 1997.

Attachment A: Survey Instruments

Attachment B: Survey Locations and Results

Attachment A

Survey Instruments

Instrument	Model No.	Serial No.	Probe	Last Calibration
Ludlum	2241-2	115135	Ludlum 44-9	08/02/96
Ludlum	2241-2	059756	Ludlum 44-9	6/14/96
Ludlum	2241-2	115135	Ludlum 44-10	08/02/96
Ludlum	2241-2	059756	Ludlum 44-10	06/14/96
Ludlum	19	011021	n/a	11/04/96



# ATTACHMENT B

Former AVCO property: Richmond, Indiana  
Survey Locations and Results

