

Report No.: C-3469/95-01

Former Licensee: American Lava Corporation
A Subsidiary of 3M

Docket No. : 040-00575 (Terminated) License No. : C-3469 (Terminated)

Current Facility Owner: Southeast Tennessee Development District 25 Cherokee
Boulevard

Chattanooga, TN 37405

Inspection Conducted: March 2, 1995

Inspection End Date: March 15, 1995 (report of contamination smear
analysis received and reviewed)

Inspector:

J. L. Henson, Health Physicist
Nuclear Materials Licensing Section

Date Signed

Accompanying NRC Personnel: Douglas M. Collins, Chief

Nuclear Materials Safety and Safeguards Branch

Division of Radiation Safety and Safeguards

Approved by:

C. M. Hosey, Chief
Nuclear Materials Inspection Section
Division of Radiation Safety and Safeguards

Date Signed

SUMMARY

Scope:

This announced followup inspection of this formerly-licensed site, which has been identified as having insufficient information in the file to demonstrate that the site had been decontaminated to NRC release limits, was conducted to determine what further actions are **required to categorically** determine that the site can be released for **unrestricted use**. The inspection included interviews with management personnel employed by the current owner of the site and a scoping inspection and survey of the area within the facility where licensed activities were formerly conducted. The extent of the survey was limited to those areas of the facility which were determined to have accessible, original building surfaces which may indicate the level and extent of any remaining contamination.

Results:

Radiation levels in accessible areas of the former American Lava Central Research Facility, at 25 Cherokee Boulevard, Chattanooga, Tennessee, where licensed activities were formerly conducted, were

generally found to be equivalent to the background radiation level. It should be noted that the main floor of this facility has undergone significant renovation since licensed activities were discontinued and therefore many of the remaining original construction floor and wall surfaces were covered with newer floor materials and wall board. Direct measurements from original building surfaces could only be obtained from two closets in the northeast corner of the facility (currently used as the Hamilton County Sheriff's Office Training Room) and from wall surfaces and metal roof trusses and supports in the attic of the facility.

Due to the limited access to original building surfaces, the inspectors could not categorically determine that the levels of contamination which may remain in the facility did not exceed the NRC limits for release of the facility for unrestricted use.

However, based upon a review of documents contained in the docket file, the major renovation of the facility since licensed activities were discontinued, and the results of this survey, one can conclude that the levels of contamination from licensed activities which may remain within this facility are not significant from a safety and health perspective, and are most likely below the criteria for the unrestricted release of the facility.

REPORT DETAILS

Persons Contacted

Joe Guthrie, Director, Southeast Tennessee Development District

Hale C. Booth, Assistant Director, Southeast Tennessee Development District

Ruben K. Crosslin, Division of Radiological Health, Tennessee Department of Environment and Conservation

Present at Exit Interview

Background

In April, 1956, the American Lava Corporation was issued Source Material License No. C-3469 authorizing possession and use of 200 pounds of refined source material for experimental purposes. In June, 1957, the license was amended to authorize possession and use of 600 pounds of refined source material for fabrication into ceramic fuel for reactors and for experimental purposes.

American Lava performed the experimental licensed activities in their Central Research Laboratory at 25 Cherokee Boulevard, Chattanooga, Tennessee. The operation consisted of two rooms in the rear of the facility. In the Preparation Room, material was weighed, ball milled, mixed, dried, and then compressed in a 65,000 p.s.i. press. In the Kiln Room, pellets received from the Preparation Room were heated in a hydrogen atmosphere. The Kiln Room was vented to a vacant lot behind the building.

On August 27, 1957, personnel from the Atomic Energy Commission (AEC) conducted an inspection of the facility. At the time of the inspection, the licensee possessed 450 pounds of **ThO₂** and **228 pounds** of UO₂- In his report, the inspector **noted that the** licensee was handling and processing source material in a competent manner. He also noted that air **samples taken during** heating and pressing operations were **being made routinely** and that to date, no significant air activity had been observed, either in the restricted area or in the unrestricted area. The inspector also obtained an independent, 30 minute air sample which when analyzed, indicated an "order of airborne radioactivity that was well within the levels established by 10 CFR 20 for an operation of this type". The inspector further noted that the walls and floor of the Preparation Room were lined with thin polyethylene sheeting which could be removed and replaced when necessary.

On June 28, 1960, American Lava requested termination of their license and on July 13, 1960, the AEC terminated the license. At the time of termination, the licensee stated that no source material was on hand, but provided no information concerning disposition of material or decontamination/ closeout surveys of the research facility. The license docket file contains no records to indicate that any AEC or NRC personnel performed a closeout confirmatory survey at the research facility since the license was terminated.

Since 1960, it appears from both interviews with the current facility owners and from a visual inspection, that the facility has undergone major renovation. This renovation apparently included the removal of floor tiles, ducts, pipes, fixtures, and interior plasterboard walls, leaving only the building's shell intact.

3. Facility Status

The former American Lava Central Research Laboratory includes a main floor and a basement. The current facility occupants include the Southeast Tennessee Development District Office and elements of the Hamilton County Sheriff's Office. Both floors are divided into office spaces, common use areas, storage rooms and larger meeting/ training rooms. That area of the facility where the Preparation and Kiln Rooms were formerly located is now a large training room for the Sheriff's Office located in the north corner of the main floor. The interior walls and floor of the training room are covered with materials installed since licensed activities were discontinued.

The only original building surfaces accessible in this area were located in two closets located in the northeast corner of the room. The original concrete floor and the interior surfaces of the painted brick walls, which are part of the building exterior, were accessible in these closets.

The only remaining area where original building surfaces and **structures were** accessible was in the attic of the facility. **A stairway from the rear of the training room lead up to the attic. A section of the attic space over the rear of the training room and an area of the facility to the southeast of the training room has a floor.** This allowed access to the **original brick surfaces** of the exterior walls above the false ceiling over the rear of the training room and in a section of the facility southeast of the training room. Some of the metal roof trusses and other roof support members that appeared to be original features of the facility were also accessible from the floored portion of the attic.

4. Independent Radiological Measurements

As originally planned, the inspection and survey at the facility was to be conducted in accordance with the NRC's Inspection Manual, Temporary Instruction (TI) 2800/026, "Followup Inspection of Formerly-Licensed Sites Identified as Potentially Contaminated". However, due to the limited availability and access to original building surfaces, a comprehensive survey as described in TI 2800/026 could not be performed.

As performed, the survey included scans and direct measurements of the accessible surfaces in the two closets in the training room, and scans of similar surfaces in the attic. Direct measurements were taken in the closets at 1 meter intervals and at points that when scanned, indicated radiation levels greater than what appeared to be the background level for the surface being surveyed. Smears for removable contamination were also obtained in the attic area and from the surfaces of the original construction walls in the training room closets. Ambient gamma radiation levels were also measured in these areas.

The scans were performed with a Ludlum Model 3 Survey Meter with a Model 44-9 "pancake" geiger-mueller detector. This instrument had an efficiency of 19.7% (technetium 99) and a minimum detectable activity (MDA) of 1733 dpm/100 cm². Direct measurements were obtained using an Eberline ESP-2 in the scaler mode (1 minute counts) with a Model HP-260 "pancake" geiger-mueller detector. This instrument had an efficiency of 22.8% and a MDA of 898 dpm/100 cm². A Ludlum Model 19 AR meter was used to measure the ambient gamma radiation levels. The contamination wipes were returned to the Region II office for analysis.

Documents describing American Lava's activities contained in the license docket file indicate that both uranium and thorium were used at this facility. Therefore, the acceptable surface contamination levels that must be met prior to release of the facility for unrestricted use are those for the radionuclide with the most restrictive limits. The unrestricted release **limits are listed in** the NRC's "Guidelines for Decontamination of **Facilities and Equipment** Prior to Release for Unrestricted Use **or Termination** of Licenses for Byproduct, Source, or **Special Nuclear Material**", July, 1982 (Attachment 1) - The **levels for thorium** listed in this document are 1000 dpm/100 cm² **average, and** 3000 dpm/100 cm² maximum, fixed contamination and 200 dpm/100 cm² removable contamination. The levels for uranium are 5000 dpm/100 cm² average, and 15000 dpm/100 cm² maximum, fixed contamination and 1000 dpm/100 cm² removable contamination.

The results of the survey are described in Attachment 2. In general, the levels of radiation detected were less than two

times the background radiation level, and in no case did they exceed 2.5 times the background level. It is most probable that the levels above the background radiation level detected on the concrete and brick surfaces are due to naturally occurring radionuclides in the sand and clay components of these materials. The results of the analysis of the removable contamination wipes indicated that there is no removable contamination above the release criteria in those areas where wipes were obtained.

6. Exit Interview

On March 2, 1995, an exit interview was conducted with the persons indicated in paragraph 1. The Southeast Tennessee Development District representatives were informed of the results of the inspection and surveys. They were informed that none of the areas surveyed appeared to have levels of fixed or removable contamination above the unrestricted release criteria. They were also informed that they would receive a copy of this report and that we would notify them of our decision regarding the radiological status of the facility.



REGION II, ATLANTA, GA.

FACSIMILE TRANSMISSION

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PAGES INCLUDING THE COVER SHEET: 10

SUR77EY ILLUSTRATIONS AND RESULTS

1. Figure 1 - Hamilton County Sheriff's Office Training Room And Attic space
2. Figure 2 - Corner Closet in Sheriff's Office Training Room
3. Figure -1 *Closet with Bifold Doors* in Sheriff's Office Training Room
4. Results of scans with Ludlum Model 3 Survey Meter (1 page)
5. Results of scans with Ludlum Model 14 MicroRXQ meter (1 page)
6. Results of Direct readings with Eberline ESP-1 (2 pages)
7. Results of Analysis of Contamination Samples (1 page)

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FIGURE

Exterior Wall

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Exterior Wall

Inspection Date: 3-P-7/95

Inspector: D. Collins

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Former American Lava Central Research Facility 29 Cherokee Avenue, Chattanooga, TN

Location:
Pocket No--

040-00575

Carport Occupant: Hamilton County
Sheriff's Office

Area 1. Surveyed: Corner of Sheriff's Office Training Room

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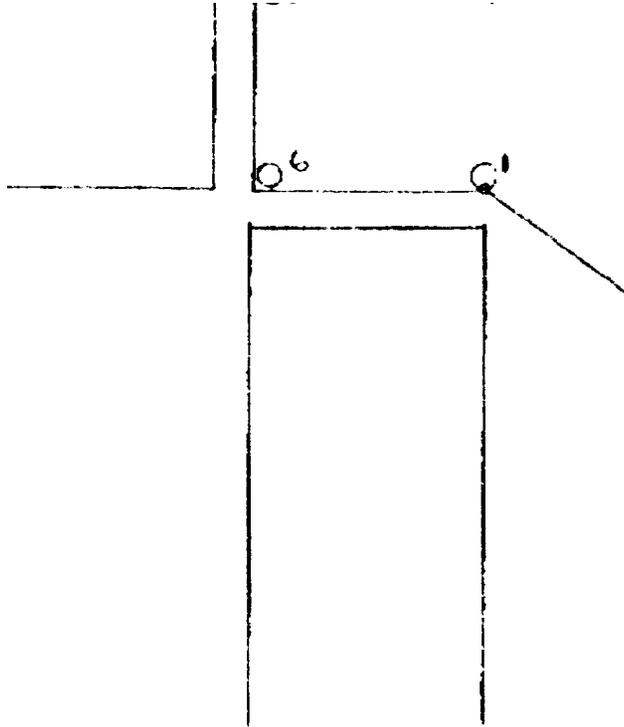
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Direction of View

1.5 feet

3.3 feet = 1 meter

FIGURE 2



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Inspectio Date: 3/2/95

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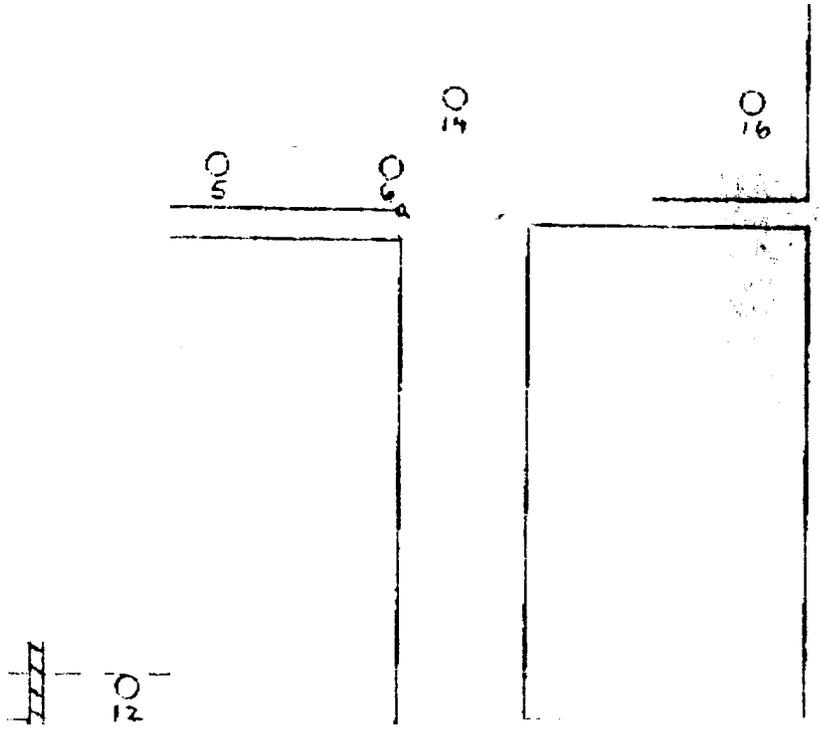
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SCOPING SURVEY RESULTS

Licensee: American Lava License No.: 2-3469
25 Cherokee Blvd Docket No.: 040-00575
Chattanooga, TN Survey Date: 3/2/95

Inspectors: J. Henson + D. Collins

Isotopes of Interest: Uranium (enriched to 20%) + Thorium 232

Instrument - Type: <u>Lodim Model 3</u>	Probe: <u>44.9</u>
Serial #: <u>102549</u>	Serial #: <u>101214</u>
NRC #: <u>043992</u>	NRC #: <u>TM PREC 029</u>
Calibration Date: <u>7/15/94</u>	Size (S): <u>15.5</u> cm ²
Efficiency (E): <u>0.197</u>	Background: <u>40 cpm</u>
Minimum Detectable Activity (MDA):	<u>1733 dpm/100 cm²</u>

Location	Gross cpm	Net cpm	Net dpm	$\frac{\text{dpm}}{100 \text{ cm}^2}$
Scan of floors and walls in corner closet of training room and closet with bi fold doors				
All results less than:	100	≤ 60	≤ 305	≤ 1965
Scans in attic area				
Top of switch box marked				
① Air conditioner front lab	< 50	≤ 10	≤ 51	≤ 329
② Top of electrical box behind ①	< 50	≤ 10	≤ 51	≤ 329
③ Along top of beam between ① + ②	< 50	≤ 10	≤ 51	≤ 329
④ Intersection of beam 1 + 2	< 50	≤ 10	≤ 51	≤ 329
⑤ Along top of beam 2	< 50	≤ 10	≤ 51	≤ 329
⑥ Beam 2 at end of flooring	< 50	≤ 10	≤ 51	≤ 329
⑦ Along beam 3	< 50	≤ 10	≤ 51	≤ 329
⑧ Beam 3 and wall at intersection	< 50	≤ 10	≤ 51	≤ 329
⑨ Scan of east wall	< 50	≤ 10	≤ 51	≤ 329

SCOPING SURVEY RESULTS

Licensee: American Lava License No.: C-3469
25 Cherokee Blvd Docket No.: 040-00575
Chattanooga, TN Survey Date: 3/2/95

Inspectors: J. Henson & D. Collins

Isotopes of Interest: Uranium (enriched up to 20%) & Thorium 232

Instrument - Type: <u>Ludlum Md14 microRmeter</u> Serial #: <u>33546</u> NRC #: <u>015528</u> Calibration Date: <u>5/23/95</u> Efficiency (E): _____	Probe: <u>N/A Internal</u> Serial #: _____ NRC #: _____ Size (S): _____ cm ² Background: <u>6µrem/hr</u>
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Location	Gross µrem/hr	Nat µrem/hr	Gross mrem/hr	Net mrem/hr
Scan of floors and walls in corner closet of training room and closet with bi-fold doors				
All results less than	10	4		
Scans of east wall in attic space and roof trusses and support beams				
All results less than	10	4		

SCOPING SURVEY RESULTS

Licensee: American Lava License No.: C-3469

25 Cherokee Blvd Docket No.: 040-00575

Chattanooga, TN Survey Date: 3/2/95

Inspectors: J. Henson & D. Collins

Isotopes of Interest: Uranium (enriched to 20%) + Thorium 232

Instrument - Type: <u>Eberline ESP-2</u>	Probe: <u>AP-220</u>
Serial #: <u>00782</u>	Serial #: _____
NRC #: <u>026729</u>	NRC #: <u>026732</u>
Calibration Date: <u>7/5/94</u>	Size (S): <u>15.5</u> cm ²
Efficiency (E): <u>0.228</u>	Background: <u>41 cpm</u>
Minimum Detectable Activity (MDA): _____	<u>898 dpm/100 cm²</u>

Location	Gross cpm	Net cpm	Net dpm	$\frac{\text{dpm}}{100 \text{ cm}^2}$
Corner closet of				
Hamilton County				
Sheriff's Office				
Training Room				
Direct measurements				
1- Floor, original concrete	59	18	79	510
2- " " "	65	24	105	677
3- " " "	47	6	26	168
4- " " "	56	15	66	426
5- " " "	69	28	123	794
6- " " "	87	46	202	1303
7- Brick, original wall	79	58	255	1645
8- " " "	85	44	193	1245
9- " " "	85	44	193	1245
10- " " "	84	43	189	1220

SCOPING SURVEY RESULTS
(continuation sheet)

Licensee: American Lava License No.: C-3469
Chattanooga, TN Survey Date: 3/2/95

Location	Gross cpm	Net cpm	Net dpm	$\frac{\text{dpm}}{100 \text{ cm}^2}$
Closet with Bi-fold doors in Training Room				
1- Floor, original concrete	74	33	145	936
2- Floor " "	58	17	75	484
3- Floor " "	58	17	75	484
4- Floor " "	50	9	40	258
5- Floor " "	57	16	70	452
6- Floor " "	68	27	119	768
7- Floor " "	54	13	57	368
8- Block, new wall	95	54	237	1529
9- Brick, original wall	89	48	211	1362
10- Brick, original wall	62	21	92	594
11- Brick, original wall	61	20	88	568
12- Brick, original wall	75	34	149	962
13- Floor, original concrete	50	9	40	258
14- Floor " "	49	8	35	226
15- Floor " "	52	11	48	310
16- Floor " "	45	4	18	116

SCOPING SURVEY RESULTS

Licensee: American Lava License No.: C-3469
25 Cherokee Blvd. Docket No.: 040-00575
Chattanooga, TN Survey Date: 3/2/95

Inspectors: J. Henson & D. Collins

Isotopes of Interest: Uranium (enriched up to 20%) & Thorium 232

Instrument - Type: _____
 Serial #: _____ NRC #: _____
 Calibration Date: 3/14/95 (Date since counted)
 Background: alpha: 0.1 beta: 0.9 gamma: _____
 Efficiency (E): alpha: 0.38 beta: 0.34 gamma: _____
 Lower Limit of
 Detection (LLD): alpha: 3.9 beta: 13.0 gamma: _____

Location	Gross cpm		Net cpm	Net dpm	dpm / 100 cm ²	
	alpha	beta			alpha	beta
Attic						
① Top of switch box: air conditioner, lab	0	1			0	2.94
② Top of electrical box behind beam #1	0	3			0	8.82
③ Intersection, beams 1+2	0	4			0	11.76
④ Beam 2, at end of flooring	0	1			0	2.94
⑤ Beam 3, at wall intersection	2	2			5.76	5.88
⑥ East wall, west of beam 3	0	2			0	5.88
Main Floor, Closets						
⑦ East, exterior wall	0	1			0	2.94
⑧ East, exterior wall	0	4			0	11.76
⑨ East, exterior wall	0	1			0	2.94
⑩ East, exterior wall	0	0			0	0
Wipes 7-10 were taken on the interior surface (brick) of the east wall						

