NRC FORM 699 (03-2013)

U.S. NUCLEAR REGULATORY COMMISSION

CONVERSATION RECORD

DATE OF SIGNATURE: 11/17/2015

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU	DATE OF CONTACT	TYPE OF CONVERSATION
Daniel H. Blossfeld, M.S., Radiation Safety Officer (RSO)	11/09/2015	☐ E-MAIL ☑ TELEPHONE ☐ INCOMING ☑ OUTGOING
E-MAIL ADDRESS: daniel.h.blossfeld@gm.com	TELEPHONE NUMBER: (586) 651-2001	

ORGANIZATION	DOCKET NUMBER(S)
General Motors LLC - Research and Development Center	030-04779
LICENSE NUMBER(S): 21-00016-04	CONTROL NUMBER(S): 587111

SUBJECT

Our review of your June 11, 2015, license amendment request. Please provide additional information by November 24, 2015, as agreed to in our call. Please email your response as pdf attachment to sara.forster@nrc.gov, or send via FAX to (630) 515-1078.

SUMMARY AND ACTION REQUIRED:

During our phone conversation, we discussed clarifications related to locations of use & facilities, materials authorizations, RSO & Radiation Safety Committee (RSC) qualifications, and program details for training, radiation safety and waste. Based on our discussion, additional information needed is outlined below. Please provide information noted below, responding via a signed & dated cover letter, using typed 8.5" x 11" sheets. Refer to NUREG 1556, Vol. 11, "Program-Specific Guidance About Licenses of Broad Scope," at http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1556/v11/, when responding. Please call or email me with any questions.

ADDITIONAL INFORMATION REQUESTED:

1. Please provide a full street address (e.g. 30500 Mound Road, Warren, Michigan) for the General Motors Research and Development Center to be listed on the license.

2. As discussed, concerning the temporary job sites authorization requested in your application, please provide the following:

   - Confirmation that the temporary job sites authorization may be removed from the license, as the current needs are actually for use at 1 of 2 Warren, Michigan and 1 Pontiac, Michigan General Motors campuses; and

   - Diagrams for the campuses of each of the 2 Warren, Michigan, and the 1 Pontiac, Michigan locations of use where radioactive materials may be used or stored under the license. For each campus, buildings where radioactive materials may be used or stored should be highlighted on the submitted diagram.

NAME OF PERSON DOCUMENTING CONVERSATION

Sara A. Forster, Materials Licensing Branch, Region III Office, 2443 Warrenville Road, Suite 210, Lisle, IL 60532; (630) 829-9892

SIGNATURE: Sara A. Forster 11/17/2015

CONVERSATION RECORD (continued)

D. Blossfeld

SUMMARY AND ACTION REQUIRED (continued):
ADDITIONAL INFORMATION REQUESTED (continued):

3. As discussed, for radionuclides to be authorized under Item 6.B. of the license, please revise application to reflect a request for byproduct material between Atomic Nos. 85 and 104, as listed on the most recent amendment to the license. It appears that the Atomic Nos. between 84 and 104 is a typographic error.

4. As discussed, please confirm that the maximum per-source activity for sources authorized in license Items 6.B. and 6.C. (including americium-241 & californium-252 sources) will not exceed 1 millicurie (or other maximum quantity, if applicable).

5. As discussed, for sealed source models NER 476A and Kellog Type GB Camera, please provide the applicable sealed source and device registry (SSDR) number, if known and available.

6. As discussed, please resubmit the name of the Radiation Safety Committee (RSC) chairperson. If the chairperson to be listed on the license is Bob R. Powell, as indicated in your June 15, 2015, letter, additional information needed is limited to the RSC chairperson's name. For other chairperson, please provide that individual's name, title, and qualifications.

7. No memorandum of understanding/delegation of authority (MOU/DOA) document was provided with the application authorizing you as the RSO. Please resubmit the MOU/DOA attached to the June 12, 2015, letter, including the name and title of the signing management official, to continue your authorization as RSO.

8. Please provide a description or organizational chart outlining the relationship between management (e.g. Mark W. Verbrugge, who signed the application), the RSC chairperson, the RSO, and individuals authorized for use of radioactive materials by the RSC. In the alternative to an organizational chart, you may provide a description of how managment authority relates to the radiation safety program.

9. For the radiation safety training program, please provide the following:

   - Minimum course instructor qualifications (e.g. RSO, authorized user, or equivalent, etc.); and

   - Description of how the adequacy of the radiation safety training is assessed.

10. For survey instrument calibrations to be performed under the license, in accordance with descriptions outlined in NUREG 1556, Vol. 11, Appendix O, please provide:

    - Training and dosimetry criteria for individuals who will perform such calibrations;

    - Facility requirements for areas where such calibrations may be performed;

    - Procedures for calibrating survey instruments, surface contamination measurement instruments, liquid scintillation counters, air samplers, and other instruments, as applicable.

    NOTE: In the alternative to providing a survey instrument calibration procedure, the licensee may providing confirmation instruments shall calibrated in accordance with NUREG 1556, Vol. 11, Appendix O, "Instrument Specifications and Model Survey Instrument and Air Sampler Calibration Program" (copy attached for reference).

Instrument Specifications and Model Survey Instrument and Air Sampler Calibration Program

Radiation Monitoring Instrument Specifications

The specifications in Table O.1 will help applicants and licensees choose the proper radiation detection equipment for monitoring the radiological conditions at their facility(ies).

Table O.1 Typical Survey Instruments[1] (instruments used to measure radiological conditions at licensed facilities).

Portable Instruments Used for Contamination and Ambient Radiation Surveys			
Detectors	Radiation	Energy Range	Efficiency
Exposure Rate Meters	Gamma, X-ray	μR-R	N/A
Count Rate Meters			
GM	Alpha	All energies (dependent on window thickness)	Moderate
	Beta	All energies (dependent on window thickness)	Moderate
	Gamma	All energies	< 1%
NaI Scintillator	Gamma	All energies (dependent on crystal thickness)	Moderate
Plastic Scintillator	Beta	C-14 or higher (dependent on window thickness)	Moderate
Stationary Instruments Used to Measure Wipe, Bioassay, and Effluent Samples			
Detectors	Radiation	Energy Range	Efficiency
LSC*	Alpha	All energies	High
	Beta	All energies	High
	Gamma		Moderate
Gamma Counter (NaI)*	Gamma	All energies	High
Gas Proportional	Alpha	All energies	High
	Beta	All energies	Moderate
	Gamma	All energies	< 1%

[1] Table from *The Health Physics & Radiological Health Handbook*, Revised Edition, edited by Bernard Shleien, 1992 (except for * items).

Model Instrument Calibration Program

Training

Before allowing an individual to perform survey instrument calibrations, the RSO will ensure that he or she has sufficient training and experience to perform independent survey instrument calibrations.

Classroom training may be in the form of lecture, videotape, or self-study and will cover the following subject areas:

- Principles and practices of radiation protection
- Radioactivity measurements, monitoring techniques, and using instruments
- Mathematics and calculations basic to using and measuring radioactivity
- Biological effects of radiation.

Appropriate on-the-job-training consists of the following:

- Observing authorized personnel performing survey instrument calibration
- Conducting survey meter calibrations under the supervision and in the physical presence of an individual authorized to perform calibrations.

Facilities and Equipment for Calibration of Dose Rate or Exposure Rate Instruments

- To reduce doses received by individuals not calibrating instruments, calibrations will be conducted in an isolated area of the facility or at times when no one else is present.
- Individuals conducting calibrations will wear assigned dosimetry.
- Individuals conducting calibrations will use a calibrated and operable survey instrument to ensure that unexpected changes in exposure rates are identified and corrected.

Model Procedure for Calibrating Survey Instruments

A radioactive sealed source(s) used for calibrating survey instruments will:

- Approximate a point source
- Approximate the same energy and type of radiation as the environment in which the calibrated device will be employed
- For dose rate and exposure rate instruments, the source should be strong enough to give an exposure rate of at least about 7.7×10^{-6} coulombs/kilogram/hour (30 mR/hr) at 100 cm [e.g., 3.1 gigabecquerels (85 mCi) of cesium-137 or 7.8×10^{2} megabecquerels (21 mCi) of cobalt-60

The three kinds of scales frequently used on dose or dose rate survey meters are calibrated as follows:

- Linear readout instruments with a single calibration control for all scales shall be adjusted at the point recommended by the manufacturer or at a point within the normal range of use. Instruments with calibration controls for each scale shall be adjusted on each scale. After adjustment, the response of the instrument shall be checked at approximately 20% and 80% of full scale. The instrument's readings shall be within ± 15% of the conventionally true values for the lower point and ± 10% for the upper point.
- Logarithmic readout instruments, which commonly have a single readout scale spanning several decades, normally have two or more adjustments. The instrument shall be adjusted for each scale according to site specifications or the manufacturer's specifications. After adjustment, calibration shall be checked at a minimum of one point on each decade. Instrument readings shall have a maximum deviation from the conventionally true value of no more than 10% of the full decade value.
- Meters with a digital display device shall be calibrated the same as meters with a linear scale.
- Readings above 2.58×10^{-4} coulomb/kilogram/hour (1 R/hr) need not be calibrated, but such scales should be checked for operation and response to radiation.
- The inverse square and radioactive decay law should be used to correct changes in exposure rate due to changes in distance or source decay.

Surface Contamination Measurement Instruments[4]

- Survey meters' efficiency must be determined by using radiation sources with similar energies and types of radiation that the survey instrument will be used to measure.

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[4] ANSI N323A-1997, "Radiation Protection Instrumentation Test and Calibration."

- If each scale has a calibration potentiometer, the reading shall be adjusted to read the conventionally true value at approximately 80% of full scale, and the reading at approximately 20% of full scale shall be observed. If only one calibration potentiometer is available, the reading shall be adjusted at mid-scale on one of the scales, and readings on the other scales shall be observed. Readings shall be within ±20% of the conventionally true value.

Model Procedures for Calibrating, Liquid Scintillation Counters, Gamma Counters, Gas Flow Proportional Counters, and Multichannel Analyzers

A radioactive sealed source used for calibrating instruments will do the following:

- Approximate the geometry of the samples to be analyzed
- Approximate the same energy and type of radiation as the samples that the calibrated device will be used to measure.

Calibration

- Calibration must produce readings within ± 20% of the actual values over the range of the instrument.
- Calibration of liquid scintillation counters will include quench correction.

Calibration Records

Calibration records, for all survey instruments, should indicate the procedure used and the data obtained. The description of the calibration should include:

- The owner or user of the instrument
- A description of the instrument, including the manufacturer's name, model number, serial number, and type of detector
- A description of the calibration source, including the exposure rate at a specified distance or activity on a specified date
- For each calibration point, the calculated exposure rate or count rate, the indicated exposure rate or count rate, the deduced correction factor (the calculated exposure rate or count rate divided by the indicated exposure rate or count rate), and the scale selected on the instrument
- For instruments with external detectors, the angle between the radiation flux field and the detector (i.e., parallel or perpendicular)

- For instruments with internal detectors, the angle between radiation flux field and a specified surface of the instrument
- For detectors with removable shielding, an indication whether the shielding was in place or removed during the calibration procedure
- The exposure rate or count rate from a check source, if used
- The name of the person who performed the calibration and the date it was performed.

The following information will be attached to the instrument as a calibration sticker or tag:

- For exposure rate meters, the source isotope used to calibrate the instrument (with correction factors) for each scale
- The efficiency of the instrument, for each isotope the instrument will be used to measure (if efficiency is not calculated before each use)
- For each scale or decade not calibrated, an indication that the scale or decade was checked only for function but not calibrated
- The date of calibration and the next calibration due date
- The apparent exposure rate or count rate from the check source, if used.

Air Sampler Calibration

In order to assess accurately the air concentration of radioactive materials in a given location, the volume of air sampled and the quantity of contaminant in the sample must be determined. Accurate determination of the volume of air sampled requires standard, reproducible, and periodic calibration of the air metering devices that are used with air sampling instruments.

The publication entitled "Air Sampling Instruments" found in the 7th Edition, American Conference of Governmental Industrial Hygienists, 1989, provides guidance on total air sample volume calibration methods acceptable to NRC staff, as supplemented below.

Frequency of Calibration

- A licensee committed to a routine or emergency air sampling program should perform an acceptable calibration of all airflow or volume metering devices at least annually (See Regulatory Guide 8.25).
- Special calibrations should be performed at any time there is reason to believe that the operating characteristics of a metering device have been changed, by repair or alteration, or whenever system performance is observed to have changed significantly.

- Routine instrument maintenance should be performed as recommended by the manufacturer.
- Primary or secondary standard instruments used to calibrate air sampling instruments should be inspected frequently for consistency of performance.

Error Limit For Measurement of Air Sample Volume

Most methods of calibrating airflow or air volume metering devices require direct comparison to a primary or secondary standard instrument, to determine a calibration curve or a correction factor. An example of a primary standard is a spirometer that measures total air volume directly with high precision by liquid displacement. An example of a secondary standard is a wet-test meter that has been calibrated against a primary standard.

The following are significant errors associated with determining the total air volume sampled:

E_C: The error in determining the calibration factor. (An acceptable estimate is the percentage error associated with the standard instrument used in the calibration.)[5]

E_S: Intrinsic error in reading the meter scale. (An acceptable estimate is the percentage equivalent of one-half of the smallest scale division, compared to the scale reading.)

E_t: The percentage error in measurement of sampling time that should be kept within 1%.

E_V: The most probable value of the cumulative percentage error in the determination of the total air volume sampled. E_V can be calculated from the following equation, provided there are no additional significant sources of errors:

$$E_V = [E_S^2 + E_C^2 + E_t^2]^{1/2}$$

The most probable value of the cumulative error E_V, in the determination of total volume, should be less than 20%.

A sample calculation of the most probable value of the cumulative error in total volume measured is as follows: If accuracies of the scale reading, the calibration factor, and sample time are ± 4, 2, and 1%, respectively, and there are no other significant sources of error, the cumulative error would be:

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[5] The calibration factor should be based on two kinds of determinations. First, correction factors should be determined at several flow rates distributed over the full-scale range. Each flow rate correction factor should be determined while adjusting flow rates upscale and again while adjusting flow rates downscale, and the two sets of data should be compared. Second, subsequent calibrations should compare the new correction factors to those determined during the previous calibration. If observed differences are significant compared to the overall volume error limit of 20%, an additional error term should be included in the calculation above.

$E_V = [4^2 + 2^2 + 1^2]^{1/2} = 4.58\%$ or approx. 5%

If there are significant differences in pressure and temperature between the calibration site and the sampling site, appropriate corrections should be made using the ideal gas laws provided below:

Vs = V1 * (P1/760) * (273/T1)

where V_s = volume at standard pressure and temperature (760 mm Hg and 273°K
V_1 = volume measured at conditions P_1 and T_1
T_1 = temperature of V_1 in K
P_1 = pressure of V_1 in mm Hg

Documentation of Calibration of Air Metering Devices

The licensee should maintain records of all routine and special calibrations of airflow or volume metering devices, including the primary or secondary standard used, method employed, and estimates of accuracy of the calibrated metering devices. All instruments should be clearly labeled as to the date and results of the most recent calibration and should include the appropriate correction factors to be used.

References: See the Notice of Availability on the inside front cover of this report to obtain a copy of:

1. Draft Regulatory Guide FC 413-4, "Guide for the Preparation of Applications for Licenses for the Use of Radioactive Materials in Calibrating Radiation Survey and Monitoring Instruments," June 1985.

2. Regulatory Guide 8.25, Revision 1, "Air Sampling in the Workplace," June 1992.

3. NUREG-1400, "Air Sampling in the Workplace," September 1993.

Additional References:

4. The Health Physics & Radiological Health Handbook, 3rd Ed. Edited by Bernard Shleien, Lester A. Slaback, Jr., and Brian Kent Birky, 1998.

5. ANSI N323A-1997, "Radiation Protection Instrumentation Test and Calibration, Portable Survey Instruments." Copies may be obtained from the American National Standards Institute, 1430 Broadway, New York, NY 10018 or ordered electronically at the following address: <http://www.ansi.org>.

6. "Air Sampling Instruments," American Conference of Governmental Industrial Hygienists, 7th Edition, 1989.

7. DOE G 441.1-7, "Portable Monitoring Instrument Calibration Guide," U.S. Department of Energy, March 1999.

8. DOE G 441.1-8, "Air Monitoring Guide," U.S. Department of Energy," March 1999.

Forster, Sara

From:	Forster, Sara
Sent:	Tuesday, November 17, 2015 10:27 AM
To:	'daniel.h.blossfeld@gm.com'
Subject:	Additional Information Request for General Motors LLC Lic. No. 21-00016-04, CN 587111
Attachments:	03610.587111.21-00016-04 telecon signed.pdf

Dear Mr. Blossfeld:

See the attached file for additional information needed to complete the review of the renewal application for the above referenced license. Note that the attached 10-page conversation record (2 pages of text plus 8 pages of supplemental guidance materials, for your convenience) requests additional information on or before close of business on Tuesday, November 24, 2015. Additional guidance may be found in NUREG 1556, Vol. 11, "Program Program-Specific Guidance About Licenses of Broad Scope," which may be found at:

http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1556/v11/

Submission of your response as a pdf file attached to an email or via facsimile will allow for the quickest processing. Please call me to confirm receipt of this email, and to discuss the general scope of your licensed program. Do not hesitate to call me with any questions you may have, or if you will need additional time to complete your response.

Sincerely,

Sara A. Forster, U.S. Nuclear Regulatory Commission - Region III
Division of Nuclear Materials Safety
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Protecting People and the Environment