

**Pavement & Materials Partnering Committee**  
**Work Product Short Scoping Document**  
**Use of Low Nuclear Density Gauge to Determine Compaction of**  
**Unbound Materials**  
**October 5, 2022**

**Task Group**

Foundations Subtask Group  
Concrete Task Group

**Problem Process**

- Annual
- Expedited
- Emerging Initiative

**Title**

Use of Low Nuclear Density Gauge to Determine Compaction of Unbound Materials

**Statement of Effort/Improvement**

The low nuclear density gauge (LNDG) has low nuclear emission and could be used for the compaction determination of unbound materials. LNDG is safe to use and does not require a radioactive material license for operation, and potentially saves time and money by not requiring a radioactive materials license, permits, training, and special storage.

**Purpose**

To identify the accuracy and repeatability of low nuclear density gauges (LNDG) to potentially replace or supplement the current nuclear density gauges used when performing CT 231 for compaction tests.

The use of a low nuclear density gauge with an electromagnetic moisture probe which meets the ASTM Standards D-8167 and ASTM D-8153 will have a significantly positive impact on the environment, carbon emissions, and safety of employees. Additionally, Caltrans and Industry will save time and money from no requirement of a radioactive materials license from the health department, reduced paperwork, and not require time-consuming travel to and from designated storage on a daily basis.

**Background**

Nuclear gauge users trust the technology for their QC/ QA testing compaction of granular materials. The strict regulatory requirements and fees have made their use challenging and time-consuming. The low nuclear density gauges Troxler 4540 and 4590 E-Gauge eliminates the need to store the gauge at a designated location, take safety training, and keep many documents on file. The nuclear density measurement technology utilizes a low activity source

therefore the exposure to the user is also much lower. Safety and environmental friendliness are two main benefits of the LNDG.

The advantages for Caltrans and Industry are the ability to use less fuel for driving back and forth from the storage facility every day which will reduce traffic on the roadways, reduce emissions by reducing the mileage driven every day, and reduce employee hours spent driving back and forth to the Storage locker in the morning and afternoon every day. It will reduce the gasoline burnt and money spent on fuel. It will eliminate the need for a radiation storage locker, radiation materials license, TLD personal dosimetry badges, reduce costs, and increase efficiency. It will also increase the safety of each employee who uses a low nuclear density gauge.

**Estimated Duration**

1 year

Pavement & Materials Partnering Committee  
 Work Product Scoping Document  
*Foundations Subtask Group, Concrete Task Group*  
*Use of Low Nuclear Density Gauge to Determine Compaction of Unbound*  
*Materials*  
 October 5, 2022

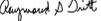
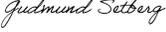
---

**Recommendation and Approval**

**Scoping Document Recommendation and Industry Concurrence by PMPC TG:**

<b>Caltrans Name (Recommendation)</b>		<b>Industry Name (Concurrence)</b>	
 <u>Keith Hoffman (Oct 24, 2022 11:49 PDT)</u>	10/24/2022	 <u>George Butorovich (Oct 24, 2022 12:38 PDT)</u>	10/24/2022
Keith Hoffman Caltrans Task Group Chair	Date	George Butorovich Industry Task Group Lead	Date
 <u>Kuo-Wei Lee</u>	10/25/2022	 <u>Mark Hill (Oct 24, 2022 13:40 PDT)</u>	10/24/2022
Kuo-Wei Lee Caltrans Task Group Member	Date	Mark Hill Industry Task Group Member	Date
 <u>Joseph Dongo</u>	11/04/2022		
Joseph Dongo Caltrans Task Group Member	Date		

**Scoping Document Approval and Industry Concurrence by PMPC EC:**

<b>Caltrans Name (Recommendation)</b>		<b>Industry Name (Concurrence)</b>	
 <u>Tom Pyle</u>	11/16/2022	 <u>Brandon Milar (Nov 29, 2022 09:49 PST)</u>	11/29/2022
Tom Pyle Caltrans Executive Committee Chair	Date	Brandon Milar Industry Executive Committee Member	Date
 <u>Raymond D. Tritt</u>	11/28/2022	 <u>Charles Rea (Nov 17, 2022 15:04 PST)</u>	11/17/2022
Raymond Tritt Caltrans Executive Committee Member	Date	Charley Rea Industry Executive Committee Member	Date
 <u>Gudmund Setberg</u>	11/16/2022		
Gudmund Setberg Caltrans Executive Committee Member	Date		
 <u>Timothy Greutert</u>	11/16/2022		
Timothy Greutert Caltrans Executive Committee Member	Date	Approval Date: <u>11/29/2022</u>	