From:	Benoit Midol	
To:	Lizette Roldan-Otero; Janine Katanic	
Cc:	Fraser Wyllie; Michelle Harris; Ben Maraivalu; Craig Wrigglesworth;	Lelani Collier; Charles Sweeney
Subject:	[External_Sender] RE: Response to Apparent Violations in NRC Insp	pection Report 030-38318/2024-001; EA-24-071 - Notification of response format
Date:	Monday, October 28, 2024 2:44:27 AM	
Attachments:	image001.png image002.png image003.png image004.png	
	MCD NRC Response Letter_241029.pdf Response list to NRC_25102029.xlsx	ADAMS Accession # ML24311A078

Response email 1 in 4

Kia Ora Korua Lizette and Dr Janine Katanic,

Please find attached McConnell Dowell's response to NRC Inspection Report 030-38318/2024-001,

We do hope that this will meet your requirements and remain available should you have any question,

Ngā mihi | Kind regards,

### Benoit Midol

General Manager Pacific Islands

McConnell Dowell

M: +64 220105680

This email, including any attachments, is confidential and may be privileged. If you are not the intended recipient please notify the sender immediately, and please delete it; you should not copy it or use it for any purpose or disclose its contents to any other person. We may collect personal information in the course of our interactions with you. For further information please see our privacy collection notice available on our website.

From: Lizette Roldan-Otero <Lizette.Roldan-Otero@nrc.gov>

Sent: Saturday, October 5, 2024 2:42 AM

To: Craig Wrigglesworth <Craig.Wrigglesworth@mcdgroup.com>; Fraser Wyllie <Fraser.Wyllie@mcdgroup.com>

Cc: Michelle Harris < Michelle.Harris@mcdgroup.com>; Benoit Midol < Benoit.Midol@mcdgroup.com>; Ben Maraivalu

<Ben.Maraivalu@mcdgroup.com>; Janine Katanic <Janine.Katanic@nrc.gov>; Lelani Collier <Lelani.Collier@mcdgroup.com>; Charles Sweeney <Charles.Sweeney@mcdgroup.com>

Subject: RE: Response to Apparent Violations in NRC Inspection Report 030-38318/2024-001; EA-24-071 - Notification of response format

You don't often get email from lizette.roldan-otero@nrc.gov. Learn why this is important

Hi Craig -

Thank you for responding timely with your choice of providing a written response.

You may send the response electronically to me and Dr. Janine Katanic. It would have to be in the format of a PDF document with a date, signature by management, and preferably on a letterhead.

Let me know if you have any other questions or concerns.

Regards,

### Lizette Roldán-Otero, Th.D., Chief

RIV/DRSS/MIB Office: 817-200-1455 Cell: 630-453-3812

From: Craig Wrigglesworth <<u>Craig.Wrigglesworth@mcdgroup.com</u>>

Sent: Thursday, October 3, 2024 9:48 PM

To: Lizette Roldan-Otero <<u>Lizette.Roldan-Otero@nrc.gov</u>>; Fraser Wyllie <<u>Fraser.Wyllie@mcdgroup.com</u>>

Cc: Michelle Harris <<u>Michelle.Harris@mcdgroup.com</u>>; Benoit Midol <<u>Benoit.Midol@mcdgroup.com</u>>; Ben Maraivalu

<<u>Ben.Maraivalu@mcdgroup.com</u>>; Janine Katanic<<u>Janine.Katanic@nrc.gov</u>>; Lelani Collier<<u>Lelani.Collier@mcdgroup.com</u>>; Charles Sweeney<<u>Charles.Sweeney@mcdgroup.com</u>>

**Subject:** [External\_Sender] Response to Apparent Violations in NRC Inspection Report 030-38318/2024-001; EA-24-071 - Notification of response format

Lizette,

We thank you for your email and attached letter and would like to confirm that we would like to take Option 1 (respond in writing within 30 days of your email.

We would also like to ask if it possible to only send the written response via e-mail?

The postal service from American Samoa is somewhat intermittent and we find that we cannot guarantee delivery on time.

Regards

### **Craig Wrigglesworth**

Branch Manager

M<sup>c</sup>Connell Dowell

Tafuna Industrial Park, Airport Road, Pago Pago American Samoa 96799, AS E: <u>Craig.Wrigglesworth@mcdgroup.com</u> M: +1 (684) 256 5229

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### **Craig Wrigglesworth**

### Branch Manager

### McConnell Dowell

This email, including any attachments, is confidential and may be privileged. If you are not the intended recipient please notify the sender immediately, and please delete it; you should not copy it or use it for any purpose or disclose its contents to any other person. We may collect personal information in the course of our interactions with you. For further information please see our privacy collection notice available on our website.

From: Lizette Roldan-Otero <<u>Lizette.Roldan-Otero@nrc.gov</u>>

Sent: Wednesday, October 2, 2024 1:18 AM

To: Fraser Wyllie < Fraser.Wyllie@mcdgroup.com>

Cc: Michelle Harris <<u>Michelle.Harris@mcdgroup.com</u>>; Craig Wrigglesworth <<u>Craig.Wrigglesworth@mcdgroup.com</u>>; Benoit Midol <<u>Benoit.Midol@mcdgroup.com</u>>; Ben Maraivalu <<u>Ben.Maraivalu@mcdgroup.com</u>>; Janine Katanic <<u>Janine.Katanic@nrc.gov</u>> Subject: NRC Inspection Report for McConnell Dowell LTD

Importance: High

You don't often get email from lizette.roldan-otero@nrc.gov. Learn why this is important

Dear Fraser Wyllie -

Attached is the NRC inspection report for the unannounced routine inspection that was conducted at your facility on February 20-21, 2024. Based on the results of the inspection, 11 apparent violations were identified and are being considered for escalated enforcement action in accordance with the NRC Enforcement Policy. You have three choices on how you decide to respond to the apparent violations. You may choose to: (1) respond in writing within 30 days from the date of this email, (2) request a predicisional enforcement conference, or (3) request alternate dispute resolution. The apparent violations and these options were discussed with Benoit Midol, Craig Wrigglesworth, and Apensia Maraivalu during the exit meeting. Since this letter was signed on September 27, 2024, I am granting you 10 days from the date of this email to submit to me your choice on how McConnell Dowell will respond to the apparent violations.

If you have any questions or need further clarification on the inspection or the attached report please feel free to reach out to the inspector, Dr. Janine Katanic or myself.

Thanks,

### Lizette Roldán-Otero, Ph.D., Chief

RIV/DRSS/MIB Office: 817-200-1455 Cell: 630-453-3812



McConnell Dowell Constructors Ltd Building B, Level 3 600 Great South Road Ellerslie, Auckland 1051 PO Box 2758 Short Street, Auckland

29 October 2024

Lizette Roldan-Otero, PhD Chief, Materials Inspection Branch Division of Radiological Safety & Security, Region IV United States Nuclear Regulatory Commission

Via email: <u>lizette.roldan-otero@nrc.gov</u> RE: Response to Apparent Violations in NRC Inspection Report 030-38318/2024-001; EA-24-071

### Dear Lizette

Thank you for your email and letter, dated 2 October and 27 September 2024 respectively, regarding the unannounced routine inspection on February 20-21, 2024, at our Facility in Pago Pago, American Samoa in relation to our license No. 56-29396-01. We acknowledge that the outcome of this inspection resulted in eleven (11) apparent violations.

Please note that we took immediate corrective actions to address the storage and RSO naming violations on our license, and since receiving the above letter, detailing all eleven (11) apparent violations, we have remedied all and made provisions to prevent a recurrence.

Please find appended to this letter, a spreadsheet detailing each apparent violation and the corrective steps taken to-date, along with the expected date of full compliance. In addition, we have attached a .zip file containing evidence related to the correct steps taken.

We believe that we have now made sufficient corrective actions to address all eleven (11) apparent violations.

If you have any questions related to this, please do not hesitate to get in contact.

Yours sincerely

Benoit Midol General Manager, Pacific Islands

Encl. Excel spreadsheet Evidence (.zip file appended to email)

### **DRIVING PROGRESS**

www.mcconnelldowell.com

	Resp	onse to Apparent Violations in NRC Inspectio	on Report 030-38318/2024-001; EA-24-071	lan	
		The reason for the apparent violation or, if contested, the basis for disputing the apparent violation.	The corrective steps that have been taken and the results achieved.	The corrective steps that will be taken.	The date when full compliance will be (or has been) achieved.
1	Apparent violation of License Condition 12: Name an individual on the license to fulfil the duties and responsibilities of the Radiation Safety Officer (RSO)	MCD designated RSO, Timani Samau, moved off island just prior to the unannounced routine inspection by the NRC. MCD applied to an amendment to the license (dated May 17, 2024), for Ben Maraivalu to replace Timani. NRC technical review of Ben's training and RSO certificate indicated that the RSO training for Ben did not meet the requirements listed in Appendix C of NUREG-1556, Vol. 1, Rev 2. The initial RSO training was undertaken in New Zealand.	MCD have engaged our nuclear gauge supplier to provide the necessary user safety training, however they were unable to provide the RSO training due to a requirement to ship hard copies of the taining materials and the materials constantly getting lost on route. Therefore, we engaged the American Portable Nuclear Gauge Association (APNGA) to provide the required RSO training.	RSO training undertaken by provider APNGA: Ben Maraivalu - (10/10/2024) John Faamau - (10/11/2024) RSO training certificates are appended.	Apenisa Maraivalu (Ben) has been named RSO on the 'MCD amendment application dated May 17, 2024 for NRC License No. 56-23956 (Amendment No. 5)'. Back up RSO is John Faamau. Apenisa Maraivalu (Ben) - (10/10/2024) John Faamau - (10/11/2024)
2	Apparent violation of License Condition 15: Conduct a physical inventory every 6 months to account for all sealed sources and/or devices received and possessed under the license.	Inventory procedure, under the license, to conduct a physical invetory every 6 months was not followed.	Inventory Register has been developed, and included in the Radiation Safety Plan (R4) - dated July, 2024. See appended inventory register.	RSO will perform all required checks and tests, relating to NRC License No. 56-29396 and condition 12 - including inventory checks, as per the MCD Radiation Safety Plan (R4).	Inventory register established 03/13/2024. A copy of this inventory is appended.
3	Apparent violation of License Condition 17: Have a lock or outer locked container designed to prevent unauthorized or accidental removal of the sealed source from its shielded position.	MCD acknowledge that a nuclear gauge was left unattended and not locked at time of inspection.	MCD have padlocked all gauges and manufactured a lock box for use when travelling with the gauge. This lock box is affixed to the transportation vehicle.	NDM cabinets will be locked at all times, with the key available to the RSO (or delegate).	All gauge handles are locked with a padlock, inside the lockable cabinet. This was completed on 10/10/2024.
4	Apparent violation of 10 CFR 30.34(i): Use a minimum of two independent physical controls that formed tangible barriers to secure portable gauges from unauthorized removal.	Only one physical barrier (laboratory entrance) was in place at time of inspection.	Protocenteries appended. MCD have constructed a storeroom within the laboratory, with another lockable room inside, housing the NDM gauge lockable cabinets (2 off, to house the three NDMs). The window in the storeroom has also been suitable boarded up to prevent any unwanted access. This makes three tangible barriers to unauthorized removal.	The laboratory door is locked each night. In addition, the second and third doors will also be locked at all times. This second lockable cabinet was manufactured and installed on 10/23/2024. Photo evidence is appended.	The storeroom and lockable inside room were implemented on 24 February, 2024. The window was boarded up on 10/22/2024, for added security.
5	Apparent violation of License Condition 13: Test sealed sources for leakage and contamination at intervals not to exceed the intervals specified in the certificate of registration.	Sealed sources were not routinely tested for leakage, per the certificate of registration and were not regularly calibrated in line with manufacturer details. There were gaps between 2022, 2023 and 2024.	MCD understand the requirement to perform leakage tests on sealed sources at a minimum of 6-monthly intervals. Recent testing was performed on 03/13/2024 and more recent samples were sent for testing on 10/17/2024 (for all three gauges). This information is documented in the inventory register in #2 (evidence) above. Calibration certificates are appended as evidence (noting only one gauge is currently calibrate, as awaiting updated license to be able to send the other two for calibration / fixing).	RSO will perform all required checks and tests, relating to NRC License No. 55:2936 - including leakage tests on sealed sources, at the minimum frequency of 6-months, as per the Radiation Safety Plan (R4). RSO will consult the inventory register (in V02) for due dates for leak testing and calibration, to maintain compliance. Historic leak test results are appended, along with evidence for sending recent leak test results.	MCD expect the results from the most recent samples (sent to Humboldt on 10/17/2024) by 10/30/2024. Awaiting updated license to be able to send two of our gauges to Humboldt for calibration / fixing.
6	Apparent violation of License Condition 19: Maintain a logbook that remained at the storage location, indicated for each portable gauge possessed by the licensee: the date(s) of use, name(s) of the authorized users who will be responsible for the gauge, and the temporary job site(s) where the gauge will be used.	Whiteboard was used to log NDM gauges in/out, with a manual physical logbook available in the laboratory managers office at the time of inspection. The physical logbook failed to conduct this activity in accordance with the program, and maintain the logbook at the storage location. The manual logbook includes all gauges and provides, date of use, name of authorised user responsible for the gauge and temporary lob its / location where gauge will be used. Logbook entires for 2024 can be viewed in the appended evidence.	Physical logbook is now mounted on the wall of the locked storeroom, along with the whiteboard used for assessing inventory contained in storeroom. In addition, MCD have included a separate logbook in each NDM gauge case, to allow a record of use to travel with the unit.	The physical logbook will continue to be used and located in the storage location. The whiteboard will be used in unison, to track gauges that are in/out of the storeroom/lab. The individual logbooks, will also be completed prior to transporting a unit to a temporary job site.	The physical logbook was relocated to the storage location on 03/13/2024.
7	Apparent violation of License Condition 19: Possess and use, or have access to and use, a radiation survey meter.	MCD produced a radiation survey meter that was not functioning and operational at time of inspection.	MCD have ordered and received a new Radiation Survey Meter (10/13/2024). Unit is due to arrive in AMSAM on 25/10/2024.	MCD will maintain the calibration of this unit (due date 7/23/2025). Meter will be used in the event of an incident to determine if the shielding source is in intact, as well as during leak text of sealed sources - to monitor exposure. In the event of a leakage result - the values will be reported immediately, as per our Radiation Safety Plan (R4). Register to record results on MCD SharePoint and appended as evidence.	Radiation Survey Meter due to arrive to the laboratory in AMSAM on 10/25/2024. See photo of unit appended, along with calibration certificate of purchased unit.

			i.	1	
8	Apparent violation of License Condition 19: Maintain documentation demonstrating that unmonitored individuals are not likely to receive a radiation dose in excess of the NRC regulatory limits.	MCD possessed one individual monitoring device at time of inspection and tack of access to software did not allow any oversight of results.	MCD have designated each gauge user with a unique dosimeter and serial number. As part of the log in/out process for the gauges, a prompt and reminder to use and return the dosimeters is in place on the whiteboard and physical logbook. MCD have been continually monitoring individual users since August 2024.	Following each dosimeter use, the results will be uploaded to the software monitoring system. RSO will monitor the monthly record summary to ensure compliance with individual dosimeter monitoring. Summary of monitoring records and photo of dosimeters appended as evidence.	Individual dosimeters are now in use for all approved users (August 2024) and continuously monitored when the data is uploaded after each use.
9	Apparent violation of License Condition 19: Provide portable nuclear gauge users with training that met the NRC criteria.	MCD RSO's, and authorized users, had previously completed the user safety and RSO training through a New Zealand based provider (CiWI Train). This was deemed not to be compliant with the NUREG standards and did not meet the NRC criteria.	MCD RSO's (Apenisa (Ben) Maraivalu & John Faamau) have completed the 'Radiation Safety and Gauge-Use Course' (including the U.S.D.O.T refresher) with Humboldt, which is a prerequisite to the 'Radiation Safety Officer' (RSO) certificate, and have now also completed the RSO training through APNGA. All authorized users have recently completed the APNGA Nuclear Gauge and US Transport training. o Andrew Kuresa o William Tooala o Ima Fuavaa o Ferdinand Muoz RSO has developed a practical training program addressing: All training certificates are appended.	MCD hold a register of training, including the RSO, nuclear gauge safety and U.S.D.O.T requirements. All training and refreshers will be kept up to date by the designated RSO (Ben Maraivalu)	Ben completed RAD course - 08.13.2024 (cert no. RT13397) from Humboldt. Ben completed the RSO training with APNGA on 10/10/2024. John - completed RAD course - 08.29.2024 (cert no. RT13419) from Humboldt. John completed the RSO training with APNGA on 10/11/2024. Users completed the nuclear gauge safety training with APNGA on 11/1s/2024. o Andrew Kuresa o William Tooala o Ima Fuavaa o Ferdinand Muoz
10	Apparent violation of License Condition 19: Instruct individuals in the U.S. Dept. of Transportation requirements related to the transport of Class 7 (radioactive) materials).	At time of inspection refresher certificates were completed with RSO sign-off based on the New Zealand based training provider 'Cvill train Radiation Safety (12'. Training and sign-off performed by Craily Wrigglesworth on 30 March 2024. This was deemed not to be compliant with the NUREG standards and did not meet the NRC criteria. MCD acknowledge that the licensee failed to instruct individuals of the requirements of 49 CFR Chapter J, Subchapter C at time of inspection.	MCD RSO's (Apenia (Ben) Maralvalu & John Faamau) have completed the "Raidiaion Safety and Gauge-Use Course' (including the U.S.D.O.T refresher with Humboldk, which is a prerequisite to the "Raidiaion Safety Officer (RSO) certificate, and now completed the RSO training through APNGA. All users have recently completed the APNGA Nuclear Gauge and US Transport training. o Andrew Kuresa o William Tooala o Max Tomasi o Lima Fuavaa o Ferdinand Muoz Designated RSO has established a preactical training programme to train all authorised users in the use of the portable gauges. All certificates are appended in the V09 folder.	MCD hold a register of training, including the RSO, nuclear gauge safety and U.S.D.O.T requirements. All refresher training will be kept up to date by the designated RSO (Ben Maraivalu). Refer to the appended training matrix. Training program includes provision for: Portable gauge theory, operating procedures, emergency procedures, security, maintenance, and transportation procedures; and field training emphasizing radiation safety, including dry runs of setting up and making measurements with the gauge, controlling and maintaining surveillance over the portable gauge, performing routine cleaning and lubrication, packaging and transporting the gauge, storing the gauge, and following emergency and security procedures.	Ben completed the user safety course on 08.13.2024 (cert no. RT13397) from Humboldt. Ben completed the RSO training with APNGA on 10/10/2024. John - completedthe user course on 08.29.2024 (cert no. RT13419) from Humboldt. John completed the RSO training with APNGA on 10/11/2024. Authorized users completed the nuclear gauge safety training with APNGA on 11/12/2024: a Authorized users completed the nuclear gauge safety training with APNGA on 11/12/2024: o Andrew Kuresa o William Tooala o Max Tomasi o Lima Fuwaa o Ferdinand Muoz Training certificates are appended (V09) as evidence.
11	Apparent violation of 10 CFR 71.5(a): Use shipping papers that described the transport of Class 7 (radioactive) materials.	MCD licensed hazmat users did not follow the requirements for shipping documents when transporting Class 7 (radioactive) materials on public highways.	All RSO's and authorized users have undertaken updated training on U.S.D.O.T Hazmat for Class 7 (radioactive) materials (as above). See appended (bill of landing) paperwork as evidence of documentation accurately describing the appropriate Class 7 (radioactive) materials during transport. which will be available during and after transport.	See appended (bill of landing) paperwork as evidence of documentation accurately describing the appropriate Class 7 (radioactive) materials during transport - which will be available during and kept as a record in the laboratory office. Refresher training expiry will be monitored on the training matrix noted above.	Appropriate transportation documentation is in place, as of 10/24/2024.

### APNGA Certificate of Achievement

This confirms that

## **Apenisa Maraivalu**

Has successfully completed the APNGA Portable Nuclear Gauge

# **Radiation Safety Officer Class**

on this day

October 10, 2024

51866-172-855-9987

Certificate Serial Number

American Portable Nuclear Gauge Association P.O. Box 475, Pearce, AZ 85625 • www.apnga.com



### APNGA Certificate of Achievement

This confirms that

## John Faamau

Has successfully completed the APNGA Portable Nuclear Gauge

# **Radiation Safety Officer Class**

on this day

October 11, 2024

51865-172-867-4330

Certificate Serial Number

American Portable Nuclear Gauge Association P.O. Box 475, Pearce, AZ 85625 • www.apnga.com



				DN	M Inve	intory	Report	For M	sConnell Do	well Amer	ican Sam	oa Materi	als Laborati	ory		
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Date of									Date	(Due Date)	Less than	Greater than				
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3/13/2024	1	Humboldt	5001	1 8116	CS-137	AMBE241	3650CZ	493-11	3/13/2024	9/13/2024	^	4)	7/24/2021	5/24/2024	MCC NZ	
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3/12/2024	c	Humboldt	5001	1 10291	Ccs-137	AMBE241	Q2262	K797-21	3/12/2024	9/12/2024	~		1/25/2024	3/25/2025	Humboldt	
																Faulty - awaiting shipment to Humboldt
																once License is updated.
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									sampled sent for							To monitor with radiation survey meter,
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10/14/2024	'n	Humboldt	5001	1 10291	Ccs-137	AMBE241	02262	(797-21	sampled sent for test 17/10/2024		>	m	/25/2024	3/25/2025	Humboldt	Calibration in-date (active)











All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

Report number:	2015-W005
Report date:	29/01/2015
WOA number:	N/A

### **TEST REPORT**

Client name:	The Measurement and Calibration Centre	Order number:	NA
Client's address:	PO Box 9360, Newmarket Au	ckland	
Samples submitted by:	Agnelo Vaz	Date received:	26/01/2015
Samples analysed by:	Michelle Thomas	Analyses completed:	26/01/2015
Customer supplied description:	Nuclear density meter SN: 48 Cs-137 source SN: 6897CM Am-241 source SN: NJ05081	28	
Sample received as:	Bud.		
Analyses requested:	Cs-137, Am-241:Be		
Analytical methods:	The level of radioactivity calibrated pancake GM probe	of the sample was	checked using a

**Concentration:** If the measured value is above background at a level of confidence of 95%, then the concentration of the radionuclide is reported. The reported uncertainty is based on the combined standard uncertainty ( $u_c$ ) multiplied by a coverage factor (k) = 2 (providing a level of confidence of 95%) as described by International Organization for Standardization, Guide to the expression of uncertainty in measurement, ISO, Geneva (1995).

**Minimal Detectable Concentration:** Reporting of a 'less than' result means that the measured value was consistent with a background measurement. The minimal detectable concentration with a level of confidence of 95% for both errors of the first and second kind is calculated as described by Currie in: L A Currie, Limits for qualitative detection and quantitative determination: Application to radiochemistry, Anal. Chem. 40(3) (1968) 586-593.

Traceability: Traceability to appropriate national or international standards is maintained. Details are available on request.

Page 1/2 QM template: V I2.0

### Results

NRL number	Client sample code	Caesium-137 (Bq/sample)
2015-W005	Nuclear density meter SN: 4828 Cs-137 source SN: 6897CM	< 1.5

NRL number	Client sample code	Americium- 241 (Bq/sample)
2015-W005	Nuclear density meter SN: 4828 Am-241 source SN: NJ05081	< 11

### Additional Information

- Results relate only to the samples as received.
- No significant level of radioactivity was detected. The level of radioactivity is deemed to be significant if there is only a small probability (< 0.05 %) that the measurement result was caused by a fluctuation in the background level.
- The activity on each sample received for each radionuclide stated on this report is less than 0.2 kBq.

This report, or any copy of it, is only valid if it is complete.

13

Dr Nikolaus Hermanspahn, Environmental Physicist

Date: 29/01/2015



### WIPE TEST CERTIFICATE WTC-MCD-002

issued to:	Toetau Pouifi Tufunga	Certificate number:	WTC-MCD-002
	McConnell Dowell (American Samoa) PO Box 4664	Certificate date:	16 March 2017
	Airport Road, Industrial Park	Order number:	80011848
	Pago Pago, American Samoa	Total pages:	Ţ

Equipment type:	Nuclear Density Meter
Equipment serial number:	4828
Source serial number:	6897CM

Sample submitted by:	Stu Moulding	Sample taken:	07 February 2017
RadPro sample number:	WTK0118	Sample received:	15 March 2017
Sample media:	Becton Dickinson SWUBE	Applicator Ref: 220090	
Sample analysis type:	C3-137	Analysis date:	15 March 2017
Sample analysed by:	Carl Dawson	Measured activity:	< 0.88 Bg

**Method of Analysis** 

The level of radioactivity present on the sample was counted using a calibrated GM pancake probe and scaler

### Activity

The activity of the radionuclide is reported if the measured value is above background at a level of confidence of 95%.

### **Minimum Detectable Activity**

Reporting a "less than" result means that the measured value was consistent with a background measurement. The minimum detectable activity with a level of confidence of 95% is determined as described by Currie L.A. in *Limits for qualitative detection and quantification determination, Analytical Chemistry* 40(3),587-593, 1968.

### Notes

- 1 This certificate applies only to the sample identified above.
- 2 No significant level of radioactivity was detected on the sample identified above. The level of radioactivity is deemed to be significant if there is only a small probability (< 0.05%) that the measured value was caused by a fluctuation in the background radiation level.</p>
- 3 The activity on the sample for the radionuclide identified in the analysis type above is less than 185 Bq (0.005 µCi)

### This certificate, or any copy of it, is only valid if it is complete.

Certificate aut	horised by:	a alian ka ang sa	
Circumstance	00	Name:	Carl Dawson
JISHALWIC,	I Carry	On:	16 March 2017



19 February 2015

**CALIBRATION CERTIFICATE** 

McConnell Dowell Construction Limited PO Box 2758 Shortland Street Auckland 1140

Attention: Simon Batchelor

Simon Batchelor Client Ref:

706902.00 Certificate No:

Page 1 of 3 Pages

### CALIBRATION OF A NUCLEAR MOISTURE DENSITY GAUGE.

DESCRIPTION: A gauge for measuring the compaction and moisture content of soils.

MANUFACTURER: Humboldt Scientific.

<b>IDENTIFICATION:</b>	Serial Number of Gauge	4828
	Serial Number of Gamma Source	6897CM
	Serial Number of Neutron Source	NJO5081

**DATE OF EXAMINATION:** 17 February 2015.

BASIS OF EXAMINATION: "Methods manual section 6.9", NZS 4407; Test 4.2.4 1991 Calibration of a Nuclear Surface Moisture-Density Gauge using five standard density blocks and two standard moisture blocks. The blocks have calibrations that are traceable to national standards.

The gauge calibration is valid for the density range 1728 to 2756 kg/m<sup>3</sup>.

The density and moisture calibration was checked both on arrival and after final calibration. The gauge was fully serviced to restore factory mechanical and electrical settings before the final calibration.

To maintain compliance with this standard the gauge must be calibrated at least every two years or after major repairs.

Report prepared by: AVac Agnelo Vaz Report checked by: Tim Hunter

Approved Signatory: AVaz Agnelo Vaz

Steven Anderson

All measurements reported herein have been performed in accordance alibration with the laboratory's laboratory scope of accreditation

This certificate shall not be reproduced except in full, without written approval from the Measurement and Calibration Centre.

p. +64 9 362 1720 +64 9 362 1729

e. enquiries@themcc.co.nz w. www.themcc.co.nz

### THE MEASUREMENT & CALIBRATION CENTRE LIMITED (MCC) TERMS OF BUSINESS

### 1 GENERAL

- All goods are subplied or services carried out on the basis of the following terms and conditions, unless otherwise agreed in writing.
- 1.2 In the event of any conflict between this contract and any subsequent written contract between us, the terms of the subsequent written contract shall prevail.
- 1.3 The Estimated Price or Quoted Price, Estimated Completion Date and Project Aims are set out in the accompanying Wark Order

### 2. QUOTATIONS AND ESTIMATES

- 2.1 A Quoted Price for supply of goods or services is valid for 30 days
- 2.2 Where an Estimated Price is provided the Client will receive the full benefit of any lesser cost for the subply of the goods or services. Should it appear likely to MCC that the Estimated Price will be exceeded by at least the greater of 10% or \$500 MCC shall advise the Client and not incur further expense. The Client shall have the options of terminating the contract upon payment of MCC's charges to the date of advice up to a maximum of \$500 or 10% in excess of the Estimated Price, whichever is greater; or of negativiting an additional fee for the completion of the work.

### 3. PERFORMANCE

- MCC shall use its best endeavours to achieve the Project Aims of the Quoted or Estimated Price using its current resources.
- 3.2 MCC does not warrant that the Project Aims can be thet, but will notify the Client immediately II MCC concludes that it cannot aris unlikely to be able to achieve them.
- 3.3 MCC shall not be liable for any delay or non-beitarmance arising from or athibutable to aircumstances beyond their control including but not limited to acts of God, labour disputes, transportation delays, delays in the supply of goods or services by suppliers to MCC.
- 3.4 MCC shall not be liable for any delay or non-performance of Pioject Aims or for exceeding the Estimated or Subtred Piloe because of any non-disclosure or withouting of information relevant to the Project Aims by the Client or its agents.

### 4. PAYMENT

- 4.1 Payment for all goods and services is due on the 20th of the month following the date of issue of invoice. In the case of projects of greater, than one month duration, invoices may be issued in a monthly basis. Interest shall be calculated monthly and payable on all averdue sums at 2% above the average monthly Westpac base lending rate from the date payment is due until payment is received.
- 4.2 If the Cilent fails to take delivery of goods within seven days of withen notification of their readiness, MCC may charge the Client for their storage. It storage charges are likely to exceed the value of goods MCC may notify the Client and if the Client aces not then take delivery, dispose of the goods. Any surplus shall be refunded to the Client. Any expenses thereby nourined will be to the Client's account.
- 4.3 If any payment is overdue MCC may withhold or suspend supply of goods or services and the licensing of dny rights under clause 11 hereof until such payment is made.

### 5. CONFIDENTIALITY AND PUBLICATION OF RESULTS

- 5.1 NCC shall keep in confidence all confidential information it has received from the Client except confidential information in MCC's passession prior to receipt from the Client
- 5.2 MCC shall keep the results of work undertaken on behalf of, and paid for by the Client, as confidential to the Client. MCC may publish any results with the prior written approval of the Client.
- 5.3 The Client shall refer any proposed publication of test results or other work undertaken by MCC under this contract to MCC for approval, such approval to be not unreasonably withheld. MCC approval may be withheld if MCC believes in good faith and on reasonable.

grounds that the proposed publication does not completely accurately represent the results of the work undertaken.

5.4 The use of the names symbols or abbreviations of The Measurement and Colloration Centre Umited in conjunction with any proposed manufacturing of marketing of goods or services requires the pror written approval at the Directors of The Measurement and Calibration Centre Limited.

### 6: OWNERSHIP

Property in any goods provided under this contract shall pass to the Client only on the full performance of the obligations of the Client, including the payment of all amounts payable.

### 7. WARRANTIES

- 7.1 MCC warrants that fair a period of one month from delivery date goods supplied will be tree from any defect in materials or workmanship due to any negligence or default on the part of MCC anis-employees. In the event of such a defect being notified by the Client to MCC within the said period. MCC shall at its own discretion replace or repair the goods or provide a full refund. MCC may as for the refur of the defective goods prior to making a refund.
- 7.2 MCC does not warrant that manufacture of, or dealing in products or methods developed under this contract is not an infringement of any intellectual property rights of third parties.

### 8. LIABILITY AND INDEMNITY

- 8.1 Except for the express warranties herein contained MCC shall be under no liability in respect of the provision of goods and services under this contract.
- 8.2 The maximum liability of MCC in respect of this contract shall be limited to sums paid by the Client to MCC for the goods or services provided.
- 8.3 MCC shall not be responsible for any special, indirect, incidental or ideatequential damages not far any last profits or injury arising from the provision of the goods and services.
- 8.4 MCC shall not be liable for domages of any type whatsoever or any costs arising therefrom or telating therefo sustained by or awarded against the Client arising from the Client's manufacture, use or sale of goods or services supplied by MCC.
- 8.5 the Client shall indemnity MCC against all liability of whatever kind aligning from MCC's manufacture for the Client, or the Client's manufacture, use or sale of the goods or services provided by MCC or any product or process developed therefrom or incorporating same.

### 9. TERMINATION

9.1 This project shall terminate:

a) upon completion of the Project Aims by MCC and payment by the Client, or

b upon mutual agreement of the parties

9.2 Any termination of this agreement shall be without prejudice to the signts of either party in existence plior to termination.

### **10. INTELLECTUAL PROPERTY**

Unless otherwise agreed in writing prior to the commencement of this contract all intellectual property rights alising from or developed in the course of undertaking the Project Alms shall vest in or remain with MCC. The Client shall be granted a royalty free exclusive iscence under such intellectual property rights for use within the area of application encompassed by the Project Alms subject to the Client agreeing to meet the reasonable costs of securing protection which the Client has agreed to in advance.

### **NOTICES**

Any notices sent by pre-paid post to the last known address of the orderssee shall be deemed to have been given two working days after posting of the next following working day if sent by fax.

The Measurement & Calibration Centre Ltd Continuation of Certificate No. 706902.00 CALIBRATION OF A NUCLEAR MOISTURE DENSITY GAUGE

### RESULTS

1

Due to the effect of chemical composition or site conditions, the calibration equations derived from the standard blocks may not be applicable to all materials. The standard test method does not give guidance as to what constitutes a separate material type for which a different calibration is required. It is expected that each user will determine which materials need separate calibrations, based upon experience and field conditions.

### Leak Test

A leak test was carried out by the National Centre for Radiation Science and no significant level of radioactivity was detected. Refer ESR report No 2015-W005.

### Density.

The gauge calibration has been verified on a Limestone block and a Granite block. The mean density of the two blocks is 2431 kg/m<sup>3</sup>. The response of the gauge to the mean density of the blocks is assumed to be equivalent to soil.

The estimated measurement uncertainty of the laboratory calibration expressed at the 95% confidence level is:-

Backscatter Mode  $\pm$  50 kg/m<sup>3</sup>

Direct Transmission Mode  $\pm$  27 kg/m<sup>3</sup>

The coverage factor is 2.

### Moisture.

The gauge calibration has been verified on a Magnesium block with zero moisture, and a composite block of Polyethylene and Aluminium, allocated with an equivalent moisture content of  $499 \text{ kg/m}^3$ .

The estimated measurement uncertainty of the laboratory calibration expressed at the 95% confidence level is  $\pm$  19 kg/m<sup>3</sup> at 500 kg/m<sup>3</sup> and  $\pm$  5 kg/m<sup>3</sup> at zero moisture. The coverage factor is 2.

**Environmental conditions.** 

Temperature  $20^{\circ}C \pm 0.5^{\circ}C$ Relative Humidity  $55\% \pm 5\%$ 

**Density Calibration Equation :** 

Density kg/m<sup>3</sup> =  $1/B \ge L_n$  (A/ ((Count /Std Count ) + C))

Moisture Calibration Equation : Moisture  $kg/m^3 = ((Count / Std Count - E) / F) \times 100$ 

### **Table Definitions**

**CR** - is the ratio of the counts at 1762 kg/m<sup>3</sup> and 2243 kg/m<sup>3</sup>. **PREC** - is the repeatability of the gauge at a 68.3% confidence level for the 1 minute period. **CE** - is half the difference between the Granite and Limestone equations. **RMSE** - is the RMS value of all the types of errors (PREC and CE) and an estimated Void error. The Measurement & Calibration Centre Ltd Continuation of Certificate No. 706902.00 CALIBRATION OF A NUCLEAR MOISTURE DENSITY GAUGE

Page 3 of 3 Pages

			Η	SI			
UNITS: SI							
GAGE MODEL:	GAGE MODEL: H5001EZ SER: 4828				CALIB DA I	IE: 02/17/15 7: 1	
SOURCE TYPE: SERIAL:	GAMMA 6897CM	NEUTI NJO50	RON 81	STD COU	JNT:	DENSITY: MOISTURE	3071.4 : 488.95
		**	DENSITY CAL	BRATION I	DATA	**	
DEPTH	MAGNESI 1778	UM ]	MAGN/ALUM 2213	ALUMINUN 2706	A.	LIMESTONE 2233	GRANITE 2644
BS	1215.5		871.8	6/2 2		774 1	
50	4462.7		3089.4	2077.2		7761.0	020.9
75 -	4361.4		2887.6	1817.8		2535 0	2049.0 1776 2
100	4117.2		2604.2	1541 7		2333.0	1/10.3
125	3777.1		2275.2	1274 6		1951 2	100.4
İ50	3373.8		1955.2	1039 6		1991.4	1231.4
175	2939.8		1613.0	824.1		1272 7	1008.4
200	2478.6		1315.6	647.0		1004.0	805.3
225	2053.8		1035.6	502.0		1094.9 965 A	031.0
250	1664.6		812.4	302.0		675.2	488.0
275	1340.1	340 1 635 0		300 7 521		5216	381.3
300	1077.2		506.8	245.0		JJ1.0	297.2
		W	200.0	2-T.J.*J		414.5	239.1
DEDTU	** DE	ENSITY	PERFORMAN	CE at 2000 kg	/m^3 [	125 pcf] **	
	. A	B+100	U C	CR	PREG	C CE	RMSE
BS BS	2.62944	1.2897	2 -0.11513	1.86	9.81	31.26	36.90
50	8.09591	1.0383	7 -0.12747	1.65	4 56	5 27.03	28.53
75	9.00304	1.0765	2 -0.03632	1 68	4 14	25.18	26.55
100	10.02304	1.1531	0 0.00222	1 74	3.80	23.10	20.51
125	11.42397	1.2772	3 0.00019	1.74	3.05	25.55	24.02
150	11.78560	1 3541	4 0.013/7	1.05	2.71	23.03	20.71
175	14 03085	1 5//3	7 0.01547	2.10	2.71	22.05	23.27
200	13 64675	1 6777	7 .0.01152	2.10	0.08	19.47	20.81
225	16 08806	1.0277	· -U.UII33	2.19	3:84	23.41	24.64
250	16 67871	2 00054	+ -0.03124	2.43	3.98	18.94	20.55
275	17 1776/	2.0003	7 -0.03394 5 0.03606	2.02	4.28	17.76	19.72
300	14 32110	2.1330		2.82	4.65	11.87	15.08
	17.22110	2.1/045	-0.02900	2.80	5.16	21.18	23.56
		** M	OISTURE CAL	IBRATION D	ATA	* *	
4V		E.	LOW W 0.0	HIGH W 499.0			
			* 19.3	329.0			
	** MC	DISTUR	E PERFORMAI	NCE at 160 kg	g/m^3	[10pcf] **	
	Е	F*10	00	CR	PF	EC	RMSE
0	03820	1 0/0					
0.	.03020	1.269	34 3	5.18	4	.4	9.8



### **Kit Contents**

- 1 set of instructions
- 1 source information form
- 1 pair of impervious nitrile gloves
- 1 wipe pad in plastic transport bag
- 1 cotton-tipped swab in plastic transport tube
- 1 pre-printed wipe/swab sample identification label
- 1 pre-addressed self-adhesive envelope for sample return

### **Radiation Safety**

- A personal dosimeter should be worn during this procedure
- Place the radioactive source in its shielded position before testing
- Wear the impervious gloves provided while performing the wipe test
- •• Take all practicable steps to minimise radiation doses to personnel performing the wipe test
  - Remove gloves only after the used wipe pad or swab has be placed inside its transport bag/tube
  - Wash hands thoroughly once gloves have been removed

### **Test Procedure**

Ensure that all applicable regulatory requirements and local rules for leak testing are met. Refer to any specific wipe-test instructions provided by the manufacturer of the equipment or source under test prior to taking the wipe sample.

Select either the stick swab or the pad to make the wipe. If the source being wiped is emitting high levels of radiation or if there are irregular surfaces with hard to reach areas, select the stick swab. If the surfaces are accessible and easy to wipe, select the pad. Please note the analysis cost, whether pre or post-paid, covers analysis of only one of the media types included in the kit.

Remove the applicable swab or pad media from its transport tube or bag. The media can be left dry or it can be moistened with water, ethanol or detergent should this be appropriate for the type of equipment or source being wiped. Thoroughly wipe all of the test areas and return the sample media to its transport tube or bag.

Remove gloves by grasping their inner surface at the wrist and pulling off. Quarantine gloves until the results of the wipe test are known allowing them to be later disposed of in a suitable manner. Do not handle kit packaging until gloves have been removed to help avoid cross-contamination. If available, a survey meter should be used to check the sample for gross levels of contamination.

### Sample Return and Analysis

Affix the sample identification label to the outside of the wipe sample transport tube or bag. Complete the source information form. Seal the wipe sample and completed source identification form inside the pre-addressed envelope, apply postage and return for analysis. Please contact us if there is reason to believe that the surface dose rate outside the package could exceed 5  $\mu$ Sv/hr. On completion of sample analysis at our laboratory, a leak test certificate will be issued confirming the total activity of any radioactive material detected on the sample.





### **TEST REPORT**

Client name:	The Measurement and Calibration Centre	Order number:	N/A				
Client's address:	P O Box 9360, New market, Auckl	P O Box 9360, New market, Auckland 1149					
Samples submitted by:	Agnelo Vaz	Date received:	28/04/2017				
Samples analysed by:	Michael Lechermann	Analyses completed:	28/04/2017				
Customer supplied description:	Nuclear Density Meter 4828 Cs-137 source number: 6897CM Am-241 source number: NJO5081						
Sample received as:	Bud						
Analyses requested:	Cs-137, Am-241						
Analytical methods:	The level of radioactivity of the sample was checked using a calibrated pancake GM probe.						

**Concentration:** If the measured value is above background at a level of confidence of 95%, then the concentration of the radionuclide is reported. The reported uncertainty is based on the combined standard uncertainty ( $u_c$ ) multiplied by a coverage factor (k) = 2 (providing a level of confidence of 95%) as described by International Organization for Standardization, Guide to the expression of uncertainty in measurement, ISO, Geneva (1995).

**Minimal Detectable Concentration:** Reporting of a 'less than' result means that the measured value was consistent with a background measurement. The minimal detectable concentration with a level of confidence of 95% for both errors of the first and second kind is calculated according to ISO standard 11929 "Determination of the characteristic limits (decision threshold, detection imit and limits of confidence interval) for measurements of ionizing radiation – Fundamentals and application".

Traceability: Traceability to appropriate national or international standards is maintained. Details are available on request.

Scope of accreditation: All test results in this report are part of the laboratory's scope of accreditation unless marked otherwise.

Page 1/2 QM template: V I4.0

### Results

Sample number	Client sample code	Caesium-137 (Bq/sample)
2017-W053	Cs-137 source number: 6897CM	< 1.5

Sample number	Client sample code	Americium-241 (Bq/sample)
2017-W053	Am-241 source number: NJ05081	< 11

### Additional Information

- Results relate only to the samples as received.
- No significant level of radioactivity was detected. The level of radioactivity is deemed to be significant if there is only a small probability (< 0.05 %) that the measurement result was caused by a fluctuation in the background level.
- The activity on each sample received for each radionuclide stated on this report is less than 0.2 kBq.

This report, or any copy of it, is only valid if it is complete.

Michelle Thomas, Environmental Radiochemist

Date: 28/04/2017



IANZ accreditation No 587

The Measurement & Calibration Centre

1 May 2017

### CALIBRATION CERTIFICATE

McConnell Dowell Constructors Limited 30 Old Wairoa Road Papakura Auckland

Attention: Simon Batchelor

Certificate No: 709668.00

Page 1 of 3 Pages

### CALIBRATION OF A NUCLEAR MOISTURE DENSITY GAUGE.

**Description:** A gauge for measuring the compaction and moisture content of soils.

Manufacture:	Humboldt Scientific.	
Model:	5001 EZ	
Identification:	Serial Number of Gauge	4828
	Serial Number of Gamma Source	6897CM
	Serial Number of Neutron Source	NJO5081

Date of examination: 27 April 2017.

**Basis of examination**: "Methods manual section 6.9". NZS 4407: Test 4.2.4 1991 Calibration of a Nuclear Surface Moisture-Density Gauge using five standard density blocks and two standard moisture blocks. The blocks have calibrations that are traceable to national standards. The gauge calibration is valid for the density range 1778 to 2706 kg/m<sup>3</sup>.

The density and moisture calibration was checked both on arrival and after final calibration. The gauge was fully serviced to restore factory mechanical and electrical settings before the final calibration.

To maintain compliance with this standard the gauge must be calibrated at least every two years or after major repairs.

### **Report prepared by:**



Agnelo Vaz I am the author of this document The MCC

**Project Director:** 



Steven Anderson I am approving this document 2017.05.01 13:23:55 +12'00' Report checked by:



Tim Hunter I have reviewed this document The MCC



Agnelo Vaz I am approving this document The MCC

**Approved Signatory:** 



All measurements reported herein have been performe in accordance with the laboratory's scope of accreditation

### **Results:**

Due to the effect of chemical composition or site conditions, the calibration equations derived from the standard blocks may not be applicable to all materials. The standard test method does not give guidance as to what constitutes a separate material type for which a different calibration is required. It is expected that each user will determine which materials need separate calibrations, based upon experience and field conditions.

### Leak Test:

A leak test was carried out by the Office of Radiation Safety and no significant level of radiation was detected. Refer ESR report No 2017-W053.

### **Density:**

The gauge calibration has been verified on a Limestone block and a Granite block. The mean density of the two blocks is 2431 kg/m<sup>3</sup>. The response of the gauge to the mean density of the blocks is assumed to be equivalent to soil.

The expanded measurement uncertainty of the laboratory calibration expressed at the 95% confidence level is:-

Backscatter Mode  $\pm$  50 kg/m<sup>3</sup>

Direct Transmission Mode ± 27 kg/m<sup>3</sup>

The coverage factor is 2.

### **Moisture:**

The gauge calibration has been verified on a Magnesium block with zero moisture, and a composite block of Polyethylene and Aluminium, allocated with an equivalent moisture content of 499 kg/m<sup>3</sup>. The expanded measurement uncertainty of the laboratory calibration expressed at the 95% confidence level is  $\pm$  19 kg/m<sup>3</sup> at 500 kg/m<sup>3</sup> and  $\pm$  5 kg/m<sup>3</sup> at zero moisture. The coverage factor is 2.

### **Environmental conditions:**

Temperature  $20^{\circ}C \pm 0.5^{\circ}C$ Relative Humidity 55%  $\pm$  5%

### **Density Calibration Equation:**

Density kg/m<sup>3</sup> =  $1/B \times L_n$  (A/ ((Count /Std Count) + C))

### Moisture Calibration Equation:

Moisture kg/m<sup>3</sup> = ((Count / Std Count - E) / F) x 100

### **Table Definitions:**

CR - is the ratio of the counts at 1762 kg/m<sup>3</sup> and 2243 kg/m<sup>3</sup>.
PREC - is the repeatability of the gauge at a 68.3% confidence level for the 1 minute period.
CE - is half the difference between the Granite and Limestone equations.
RMSE - is the RMS value of all the types of errors (PREC and CE) and an estimated Void error.

INITS: SI	TICACINE	GET	4000			C.	ALIB DATE:	04/27/17 1	
AGE MODEL:	H5001EZ	SER:	4828				ALID DAT.	1	
OURCE TYPE: ERIAL:	GAMMA 6897CM	NEUT NJO50	RON )81		STD COUNT:	D. M	ENSITY: OISTURE:	2916.8 484.6	
			** DEN	SITY CALI	BRATION DATA	**			
DEPTH	MAGNESIU 1778	JM *	MAGN	/ALUM 2213	ALUMINUM 2706	LIM	ESTONE 2233	GRANITE 2644	
DC	1150 7			34.9	616.5		747.1	599.6	
50	1139.7		20	072 6	2005.9		2653.2	1939.3	
50	42.74.7		25	72.0	1728 4		2440.5	1702.8	
100	30/3 8		24	98.8	1467.4		2165.5	1445.9	
100	2675 8		21	79.6	1219.4		1877.0	1184.4	
120	2022.0		15	868 5	984 4		1586.8	964.8	
130	2805 1		14	52.0	791.2		1303.1	766.5	
200	2805.1		10	58 7	623.6		1052.4	602.7	
200	1080.0		12	04.2	488 3		833.9	467.4	
225	1604.6		10	793.4	382.6		653.5	364.2	
230	1208 7		ć	521.8	301.4		515.9	285.2	
300	1039 8		4	188 1	243.9		405.1	233.7	
DEPTH	** H A	* DENS B*1	DITY PEI 000	RFORMAN C	CE at 2000 kg/m^2 CR I	3 [125 pc PREC	cE	RMSE	
BS	2.53723	1.2.	5980	-0.11373	1.83	10.1	26.81	33.58	
50	7.95057	1.02	2657	-0.12405	1.64	4.71	19.22	21.41	
75	9.19591	1.0	7825	-0.03323	1.68	4.21	24.48	25.88	
100	9.67968	1.1	1354	0.03532	1.71	3.98	27.64	28.76	
125	11.69175	1.23	8636	-0.00202	1.86	3.79	20.95	22.28	
150	11.50749	1.32	2656	0.02950	1.89	3.78	24.51	25.66	
175	13.09807	1.49	9954	-0.00319	2.06	3.81	21.80	23.09	
200	14.32290	1.6	5677	-0.01934	2.22	3.92	19.69	21.19	
225	15.83613	1.8	3336	-0.03078	2.42	4.09	16.68	18.58	
250	15.12795	1.9	3678	-0.03071	2.54	4.43	16.07	18.35	
275	15.88869	2.0	9857	-0.03403	2.74	4.79	10.83	14.46	
300	16.36777	2.2	5784	-0.03661	2.96	5.28	13.24	16.94	
			** MOI	STURE CA	LIBRATION DAT	A **			
				LOW W 0.0	HIGH W 499.0				
				21.9	327.7				
	k	** MOI	STURE	PERFORM	ANCE at 160 kg/m	n^3 [10po	cf] **		
	E	I	F*1000		CR	PRE	C	RMSE	

-								
1	W ON REP-18	LEAK TEST CERT	IFICATE					
	Wipe Bate <u>08-GEP-18</u> DESCRIPTION OF DEVICE/ Model <u>SOUI</u> Ser <u>4</u> <u>SOURCE 1</u> SO Material <u>CS-127</u> <u>An</u> Source Ser <u>6897cm</u> <u>N</u> RSO Name <u>10E7AU</u> <u>147</u> Telephone <u>(684)</u> <u>258-1</u> 5200174 Return Address Labei <u>- McCOMNELL</u> - PO BOX <u>460</u> - POBOX <u>600</u> - POBOX <u>600</u>	SOURCE 828 URCE 2 M-24/18 05081 UGA 195 Date Samon Date Samon MELL Am SAMON Samonn Samonn	In This Space Use Only ACTIVITY Alpha OuCi Scientific Hogan 5 Keep the m this form 6 Regulation with remov than 0.005 service fo ination or must be no	<ul> <li>Instructions</li> <li>Use wipe procedures as described in the device manual.</li> <li>Enter all information under description.</li> <li>Print or type return address in the space provided.</li> <li>Wipe source (s) and put filter paper in the plastic bag.</li> <li>Niddle copy and mail and bag to Humboldt.</li> <li>Is require that sources able activity greater uCi be removed from r repair and decontam- disposal. Authorities tified.</li> </ul>				
	<u>Device Identification:</u> Make:	Humboldt <b>Model:</b> 5	001 Serial No.:	4828				
	Sealed Source Identification:							
	Radioisotope:	Source (1) CS-137 6897CM	Source (2) AMBE241 NJ05081					
	Result of Leak Test:							
	Calibration Date: Calibration Constant (pCi/cpm): Background Measurement (cpm): Sample Measurement (cpm): Removable Activity (uCi): Measurement Date: Measured By:	BETA/GAMMA 9/24/2018 1.39 75 75 0.00E+00 9/24/2018 S. HOGAN	ALPHA 9/24/2018 1.65 0 2 0.00E+00 9/24/2018					
	This certifies that the leak test results ar $\checkmark$	e: Less than 185Bq (0.005 uCi)		Greater than 185Bq (0.005 uCi)				
	Regulations require that sources with read	emovable activities greater than 0 decontamination or disposal. Au	.005 (5.0E-03) uCi (185Bq) thorities must be notified	) be removed from service for repair				
	Humboldt Scientific, Inc.           2525 Atlantic Ave., Raleigh NC 27604, USA           Tel: (919) 832-6509, Fax: (919) 833-5283           License: NC092-750-1							

-								
1	W ON REP-18	LEAK TEST CERT	IFICATE					
	Wipe Bate <u>08-GEP-18</u> DESCRIPTION OF DEVICE/ Model <u>SOUI</u> Ser <u>4</u> <u>SOURCE 1</u> SO Material <u>CS-127</u> <u>An</u> Source Ser <u>6897cm</u> <u>N</u> RSO Name <u>10E7AU</u> <u>147</u> Telephone <u>(684)</u> <u>258-1</u> 5200174 Return Address Labei <u>- McCOMNELL</u> - PO BOX <u>460</u> - POBOX <u>600</u> - POBOX <u>600</u>	SOURCE 828 URCE 2 M-24/18 05081 UGA 195 Date Samon Date Samon MELL Am SAMON Samonn Samonn	In This Space Use Only ACTIVITY Alpha OuCi Scientific Hogan 5 Keep the m this form 6 Regulation with remov than 0.005 service fo ination or must be no	<ul> <li>Instructions</li> <li>Use wipe procedures as described in the device manual.</li> <li>Enter all information under description.</li> <li>Print or type return address in the space provided.</li> <li>Wipe source (s) and put filter paper in the plastic bag.</li> <li>Niddle copy and mail and bag to Humboldt.</li> <li>Is require that sources able activity greater uCi be removed from r repair and decontam- disposal. Authorities tified.</li> </ul>				
	<u>Device Identification:</u> Make:	Humboldt <b>Model:</b> 5	001 Serial No.:	4828				
	Sealed Source Identification:							
	Radioisotope:	Source (1) CS-137 6897CM	Source (2) AMBE241 NJ05081					
	Result of Leak Test:							
	Calibration Date: Calibration Constant (pCi/cpm): Background Measurement (cpm): Sample Measurement (cpm): Removable Activity (uCi): Measurement Date: Measured By:	BETA/GAMMA 9/24/2018 1.39 75 75 0.00E+00 9/24/2018 S. HOGAN	ALPHA 9/24/2018 1.65 0 2 0.00E+00 9/24/2018					
	This certifies that the leak test results ar $\checkmark$	e: Less than 185Bq (0.005 uCi)		Greater than 185Bq (0.005 uCi)				
	Regulations require that sources with read	emovable activities greater than 0 decontamination or disposal. Au	.005 (5.0E-03) uCi (185Bq) thorities must be notified	) be removed from service for repair				
	Humboldt Scientific, Inc.           2525 Atlantic Ave., Raleigh NC 27604, USA           Tel: (919) 832-6509, Fax: (919) 833-5283           License: NC092-750-1							

LEAK TEST CERTIFICATE Wipe Date 09-FEB-19 Instructions 1 Use WIDE procedures DESCRIPTION OF DEVICE/SOURCE Do Not Write In This Space AS described in the For HSI Use Only device manual. ser 482% Model 500/ 2 Enter all information REMOVABLE ACTIVITY SOURCE SOURCE 1 <-13 under description. Am-241:BE Bet/Gam Alpha Material 3 Print or type return 0897cm NJ05081 () \_ uCi 🕐 uCi Source Ser address in the Space Humboldt Scientific provided. TOETAU **RSO Name** TUE By ibbels Wipe source (s) and Telephone (Le84)25 Date 2019 put filter Daper i n the plastic bao. 5200174 5 Keep the middle CODV and mail Return this form and bag to ICCONNELL DOWELL Humboldt. Address 6 Regulations require that sources TAFUNA Rd. AM SAMOA. Label with removable activity PO. BOX 4664 Greater Please than 0≈005 uCr be r emoved PAGO PAGO 96799 from Type or service for repair and decontam-Print ination or disposal. Authorities a a midgroup - Com Clearly must be notified. HUMBOLDT SCIENTIFIC INC. 2525 Atlantic Ave., Raleigh, NC 27604, (919) 832-3190 **Device Identification:** Make: Humboldt Model: 5001 Serial No.: 4828 Sealed Source Identification: Source (1) Source (2) CS-137 AMBE241 Radioisotope: 6897CM NJ05081 **Result of Leak Test:** ALPHA **BETA/GAMMA** 4/22/2019 Calibration Date: 4/22/2019 1.62 Calibration Constant (pCi/cpm): 1.42 0 Background Measurement (cpm): 80 Sample Measurement (cpm): 71 Ω 0.00E+00 0.00E+00 Removable Activity (uCi): 4/22/2019 4/22/2019 Measurement Date: Measured By: S. Tibbels This certifies that the leak test results are: Greater than 185Bg Less than 185Bq (0.005 uCi) (0.005 uCi) Regulations require that sources with removable activities greater than 0.005 (5.0E-03) uCi (185Bq) be removed from service for repair and decontamination or disposal. Authorities must be notified. Humboldt Scientific, Inc. 2525 Atlantic Ave., Raleigh NC 27604, USA Tel: (919) 832-6509, Fax: (919) 833-5283 License: NC092-750-1



The Measurement & Calibration Centre Certificate Number: 712847 29 October 2019

McConnell Dowell Constructors (AS) Ltd Tafuna Industrial Park Airport Road Tafuna Western District 96799

Attention: Timani Samau

### **Calibration Certificate – Nuclear Moisture Density Gauge**

Description	A gauge for measuring the compaction and moisture content of soils.
Manufacturer	Humboldt Scientific
Model	HS-5001EZ
Identification	4828
Date of Examination	23 October 2019
Basis of Examination	"Methods manual section 5.32a.01". NZS 4407: Test 4.2.4 1991 Calibration of a Nuclear Surface Moisture-Density Gauge using five standard density blocks and two standard moisture blocks. The blocks have calibrations that are traceable to national standards.
	The gauge calibration is valid for the density range 1778 to 2706 kg/m3.
	The density and moisture calibration was checked both on arrival and after final calibration.
	The gauge was fully serviced to restore factory mechanical and electrical settings before the final calibration.
	To maintain compliance with this standard the gauge must be calibrated at least every two years or after major repairs.

Report prepared by

Bernard Kriel Calibration Technician

**Approved Signatory** 

Alter

IANZ Accreditation no 587



Al measurements reported herein have been performed in accordance with the laboratory's scope of accredition

Allan Patterson, Technical Manager

> The Measurement & Calibration Centre – A division of Geotechnics Group 19 Morgan Street, Newmarket, Auckland | PO Box 9360, Newmarket, Auckland 1149 p +64 9 356 3510 | calibration@themcc.co.nz | www.themcc.co.nz

Report checked by

Allan Patterson,

Technical

Manager

### **Results:**

Due to the effect of chemical composition or site conditions, the calibration equations derived from the standard blocks may not be applicable to all materials. The standard test method does not give guidance as to what constitutes a separate material type for which a different calibration is required. It is expected that each user will determine which materials need separate calibrations, based upon experience and field conditions.

### **Density:**

The gauge calibration has been verified on a Limestone block. The density of the Limestone block is 2225 kg/m<sup>3</sup>. The expanded uncertainty of measurement of the laboratory calibration expressed at the 95% confidence level is:-

Backscatter Mode ± 50 kg/m<sup>3</sup>

Direct Transmission Mode ± 27 kg/m<sup>3</sup>

The coverage factor is 2.

### Moisture:

The gauge calibration has been verified on a Magnesium block with zero moisture, and a composite block of Polyethylene and Aluminium, allocated with an equivalent moisture content of 535 kg/m<sup>3</sup>.

The expanded uncertainty of measurement of the laboratory calibration expressed at the 95% confidence level is  $\pm$  19 kg/m<sup>3</sup> at 500 kg/m<sup>3</sup> and  $\pm$  5 kg/m<sup>3</sup> at zero moisture.

The coverage factor is 2.

### **Environmental conditions:**

Temperature 20°C ± 0.5°C Relative Humidity 55% ± 5%

### **Table Definitions:**

CR - is the ratio of the counts at 1762 kg/m<sup>3</sup> and 2243 kg/m<sup>3</sup>.

PREC - is the repeatability of the gauge at a 68.3% confidence level for the 1 minute period.

CE - is half the difference between the Granite and Limestone equations.

RMSE - is the RMS value of all the types of errors (PREC and CE) and an estimated Void error.

### Омсс

		The Meas	surement &	Calibration Co	entre		
INITS: SI					С	ALIB DATE	: 10/23/19
AGE MODEL:	H5001EZ	SER: 482	18	CALIB BAY: 1			1
OURCE TYPE: ERIAL:	GAMMA 6897CM	NEUTRON NJO5081	E.	STD COUN	TT: D M	ENSITY: OISTURE:	2770.5 490.2
CICCUM IN		** DEN	SITY CAL	IBRATION DA	TA **		
DEPTH	MAGNES 1776	UM MAG	GN/ALUM 2217	ALUMINUM 2700	LIM	ESTONE 2221	GRANITE 2629
DC	1139.0		785.0	584.0	-	705.0	587.0
50	4065.8	5	9818.4	1907.5		464.3	1885.9
75	3978.2		017.6	1660.2		295.1	1637.9
100	3768.3	2	369.5	1398.8		027.6	1390.6
125	3437.8	2	062.8	1173.3		760.7	1147.9
150	3070.9	1	707.6	945.0	1	496.6	931.9
175	2678.3	Ĩ	466,9	751.9	1	232.4	751.4
200	2266.2	1	187.9	584.9		993.2	591.8
225	1865.7		952.9	458.1		790.7	460.2
250	1531.8	1531.8 749.2		360.4		614.4	365.6
275	1234.8		585.0	285.5		487.6	292.8
300	988.1		462.8	231.5		387.6	241.8
DFPTH	**D	ENSITY PEI R*1000	RFORMAN	CE at 2000 kg/n	n^3 [125 PREC	pef] **	RMSE
		*******					***
BS	4.23219	1.50816	-0.13916	2.13	9.33	46.73	50.32
50	7.58698	0.98762	-0.08254	1.61	4.85	41.98	43.08
75	8.99772	1.07128	-0.02726	1.67	4.35	32.20	33.35
100	9.56215	1.10414	0.05314	1.70	4.07	37:71	38.58
125	11.25832	1.27217	0.00271	1.84	3.94	28,44	29.51
150	11.41778	1.32855	0.03027	1.89	3.90	30.20	31.19
175	12.88186	1.48540	0.00551	2.04	3,90	32.16	33.09
200	13.51448	1.61043	-0.00297	2.17	4.00	33.28	54.23
225	12.01369	1.08032	-0.00506	2.23	4.28	51.81	32.94 37.93
250	14.30.300	1.89407	-0.02572	2,49	4.02 7.00	33.70	30,82
273	15.57022 13.55337	2.00324	-0.05155	2.7U 7.94	4.00 5 30	36.80	33,40
200	14/55/947	2.10/10	-0.03130	4.94	2-22	.90.0Y	40.32
		** MOIS	STURE CAL	JBRATION DA	ATA **		
			LOW W _0.0	HIGH W 535.4			
			24,0	327.0			
	** N	IOISTURE F	PERFORMA	NCE at 160 kg	m^3 [10	pcf] **	
	E	F*1000		CR	PREC	κ γ	RMSE
	almostly, life and difference and	والمراجع المراجع المحاصر والمحاصر					****

IANZ Accreditation no 587



The Measurement & Calibration Centre – A division of Geotechnics Group 19 Morgan Street, Newmarket, Auckland | PO Box 9360, Newmarket, Auckland 1149 p+64 9 356 3510 | calibration@themcc.co.nz | www.themcc.co.nz

LEAK TEST CERTIFICATE Wipe Date 04-JUN-20 instructions 1 Use DESCRIPTION OF DEVICE/SOURCE Wipe procedures Do Not Write In This Space 8 S described in the For HSI Use Only Model 5001 device ser 4828 manual. REMOVABLE Enter all information ACTIVITY SOURCE 1 SOURCE under description. Bet/Gam 5-137 Material Alpha M-241-Be 3 Print or type 0 Source Ser 6897cm NJ05081 uCi return 0 uCi address in the SDACE Humboldt Scientific provided TOETAU TURUGA **RSO** Name K By TETRI Wipe source (s) Telephone (684)258-1195 and Date JUN 30, 2020 put filter paper i n the plastic bag 5200174 5 Keep the middle copy Return and mail this form and bag MCCONNELL DOWELL to Address Humboldt. 6 Regulations require that sources TAFUNA Rd. AM SAMOA. Labei with removable activity Please greater ·Box 4664. than 0.005 uCr be removed Type or from 40 PAGO 96799. service for repair and decontam-Print Tour ination or disposal. Authorities : Tutugg @mcdgroup. Com learly must be notified. HUMBOLDT SCIENTIFIC INC. 2525 Atlantic Ave., Raleigh, NC 27604, (919) 832-3190 **Device Identification:** Make: Humboldt Model: 5001 Serial No.: 4828 Sealed Source Identification: Source (1) Source (2) Radioisotope: CS-137 AMBE241 Serial No.: 6897CM NJ05081 **Result of Leak Test: BETA/GAMMA** ALPHA Calibration Date: 6/30/2020 6/30/2020 Calibration Constant (pCi/cpm): 1.46 1.67 Background Measurement (cpm): 86 0 Sample Measurement (cpm): 82 0 Removable Activity (uCi): 0.00E+00 0.00E+00 Measurement Date: 6/30/2020 6/30/2020 Measured By: R. PIETRI This certifies that the leak test results are: Less than 185Bq Greater than 185Bq (0.005 uCi) (0.005 uCi) Regulations require that sources with removable activities greater than 0.005 (5.0E-03) uCi (185Bq) be removed from service for repair and decontamination or disposal. Authorities must be notified. Humboldt Scientific, Inc. 2525 Atlantic Ave., Raleigh NC 27604, USA Tel: (919) 832-6509, Fax: (919) 833-5283 License: NC092-750-1

### **Density/Moisture Gauge Calibration Certificate**



Humboldt Scientific, Inc.

2525 Atlantic Ave. Raleigh, NC 27604 USA T: 1.800.537.4183 F: 1.919.833.5283 www.humboldtscientific.com

Calibration Certificate Number: 20221139347

### **Customer**

3

Name:	American Sa	moa		
Address:	Tafuna Industria Pago, Pago, 967 Samoa, America	al Park, PO Box 4664 799 a		
<u>Gauge</u>			Procedure:	HCP003, AASHTO T310, T355, ASTM D2950, D6938, D7013, and D7759
Units:	SI		Calib Date:	11/2/2022
Gauge Model:	HS-5001EZ		Expiration Date:	11/2/2023
Serial Number:	4828		Calib Bay:	2
Source				
Туре:	Gamma	Neutron	Density Standard Co	unt: 2587.1
Serial:	6897CM	NJO5081	Moisture Standard Co	unt: 477.7

### **Density Counts Calibration Data**

<u>Depth (mm)</u>	<u>Magnesium</u>	<u>Magn/Alum</u>	<u>Aluminum</u>	<u>Limestone</u>	<u>Granite</u>
BS	1054.4	740.4	556.4	683.4	545.4
50	3906.3	2663.1	1810.8	2464.5	1785.5
75	3781.5	2478.5	1572.6	2242.7	1556.7
100	3581.9	2212.2	1321.1	2010.7	1300.4
125	3273.6	1932.3	1094.1	1738.9	1080.6
150	2932	1644.2	893.1	1486.2	881.8
175	2551.8	1379.9	713	1217	699.8
200	2161.5	1119.5	560.6	984.3	547.4
225	1793.5	891.1	443.5	789.8	433
250	1468.8	706.8	342.4	621.7	339.5
275	1196.1	554.5	285.3	491.6	269.1
300	954.4	442.1	229.6	393.7	226.4

### **Moisture Counts Calibration Data**

328.1

<u>Al/Poly</u> <u>Magnesium</u> 22.1

Calibration Performed By: Vincient Walker

Function: Quality Team Member

lincient Walker Signature:



Certificate Number: 3956.01

Page 1 of 4



### Humboldt Scientific, Inc. 2525 Atlantic Avenue, Raleigh, NC

Calibration Certificate Number: 20221139347

### Serial Number: 4828

The calibration and verification data contained in this report is only valid for the gauge serial number listed, and is valid for one year from the date listed on this report. The issue of this certificate verifies this gauge was found to be mechanically sound and functioning properly per Humboldt specifications, and the calibrations conforms and exceeds the requirements of AASHTO T310, T355, ASTM D2950, D6938, D7013, D7759 and ISO 17025 standards. The calibration was performed in an evironmentally controlled laboratory with the temperature maintained at 22.8°C +/-2.2°C

	Bensie	y i ciioin			14 · · · ·	
<u>Depth (mm)</u>	A	<u>B * 1000</u>	<u>C</u>	<u>PREC</u>	<u>CE</u>	<u>RMSE</u>
BS	3.16171	1.40979	-0.1318	10.4	41.6	46.6
50	8.33206	1.03906	-0.12765	4.89	39.1	40.3
75	8.46417	1.00713	0.0254	4.52	46.4	47.3
100	10.40367	1.16114	0.00851	4.15	38.4	39.3
125	11.30666	1.25566	0.01823	4.02	40.1	40.9
150	13.14242	1.41567	-0.00886	3.95	36	36.9
175	12.84467	1.47848	0.00728	4.02	39.9	40.7
200	13.64433	1.61855	-0.00742	4.15	37.6	38.5
225	15.11715	1.80101	-0.02778	4.36	33.9	35
250	14.37693	1.88455	-0.02315	4.65	38.4	39.5
275	18.80993	2.20948	-0.0462	5.09	21.5	23.8
300	15.62365	2.22067	-0.03912	5.64	33.7	35.5
	Moistu	re Perfo	r <mark>mance</mark> a	t 160 - kg	g/m⁵	
	E	F * 1	000	PREC	<u>RMSE</u>	

### Density Performance at 2000 - kg/m<sup>3</sup>

Density	and	Moisture	Calibration	Standards
---------	-----	----------	-------------	-----------

4.6

1.21435

Bay 2	<u>Standard</u> Magnesium Mag/Al Aluminum Limestone Granite	<u>Serial #</u> HS-2005 HS-2004 HS-2003 HS-2002 HS-2001	(kg/m <sup>3</sup> ) <u>Density</u> 1775 2228 2708 2182 2647	<u>Expanded</u> <u>Uncertainty</u> 0.9 1.1 1.4 1.1 1.4	<u>Date of</u> <u>Calibration</u> 7/16/2018 7/16/2018 7/16/2018 7/16/2018 7/16/2018	Date of Expiration 7/16/2023 7/16/2023 7/16/2023 7/16/2023 7/16/2023
	Granite Al/Poly	HS-2001 HS-2006	527.5	0.9	7/16/2018	7/16/2023

Al/Poly = Density value is moisture density

Restricted Use: No

0.04505

**Special Restrictions:** 

CE = Chemical Error

Note: • PREC = Precision

📧 RMSE = Root Mean Square Error

- B\*1000 = units kg/m3
- F\*1000 = units kg/m3



10.3

Certificate Number: 3956.01



Humboldt Scientific, Inc. 2525 Atlantic Avenue, Raleigh, NC

Calibration Certificate Number: 20221139347

### Serial Number: 4828

Listed below is the range of projected density standard counts for each month in the year long calibration period. This range is computed by using the known decay rate of the density source in the gauge calibrated.

	Der	osity	Mois	sture
<u>Month</u>	<u>Lower Limit</u>	<u>Upper Limit</u>	<u>Lower Limit</u>	<u>Upper Limit</u>
Dec-22	2556	2608	473	482
Jan-23	2551	2603	473	482
Feb-23	2547	2598	473	482
Mar-23	2542	2593	473	482
Apr-23	2537	2588	473	482
May-23	2532	2583	473	482
Jun-23	2527	2578	472	482
Jul-23	2522	2573	472	482
Aug-23	2517	2568	472	482
Sep-23	2513	2563	472	482
Oct-23	2508	2558	472	482
Nov-23	2503	2554	472	482
Dec-23	2498	2549	472	482

### **Projected Monthly Density Standard Count**

This instrument has been processed and calibrated in accordance with Humboldt Scientific, Inc.'s quality management system and is traceable to the SI units through the National Institute of Standards and Technology (NIST). Reported uncertainties are expressed as expanded uncertainty values at the 95% confidence level using a coverage factor of approximately K=2. Statements of compliance, where applicable, are based upon the test results falling within the specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated.

This certificate shall not be reproduced, except in full without the written permission of Humboldt Scientific, Inc.. Calibration due dates appearing on the Certificate of Calibration and label are determined by the customer and do not imply continued conformance to specifications.

The Humboldt Scientific, Inc.'s quality management system complies with the requirements of ISO/IEC 17025.





### Humboldt Scientific, Inc. 2525 Atlantic Avenue, Raleigh, NC

Calibration Certificate Number: 20221139347

Serial Number: 4828

Listed below is the verification data of the gauge calibrated. This data was collected both before and after calibration to ensure calibration accuracy. The As Found data section may be intentially left blank for newly manufactured gauges.

### **Soil Equivalent Verification Wet Density Measurement**

\*Units in kg/m<sup>3</sup>

	As Found Verification of Ga	uge Calibration Accu	racy*
<u>Depth</u>	Low Density	<u>Medium Density</u>	<u>High Density</u>
BS	1748	2137	2529
50	1688	2103	2534
75	1711	2114	2553
100	1714	2129	2558
125	1714	2126	2568
150	1717	2135	2563
175	1724	2132	2566
200	1728	2137	2565
225	1722	2138	2555
250	1725	2132	2563
275	1727	2137	2534
300	1733	2137	2537

Measured Moisture Density

559

### As Left Verification of Gauge Calibration Accuracy\*

<u>Dep</u>	<u>th</u>	Low Densit	Ľ	Medium Densi	ty	<u>High Density</u>	<u>Exp</u>	<u>. Unc. kg/m<sup>3</sup></u>
BS	5	1738		2122		2555		36
50	)	1733		2143		2577		19
75	5	1722		2148		2574		21
10	0	1735		2137		2574		17
12	5	1738		2142		2573		15
15	0	1733		2138		2589		19
17	5	1735		2137		2574		15
20	С	1725		2142		2566		13
22	5	1732		2140		2563		22
25	С	1733		2135		2571		11
27	5	1720		2121		2553		19
30	C	1725		2137		2557		36
			Measure	ed Moisture De	nsity	527		5.5
			LOW	MED	<u>HIGH</u>	MOISTURE	2	
	Soil Equivalent	t Density	1754	2170	2611	527.5	(kg/m³)	

Calibration Performed By: Vincient Walker

Function: Quality Team Member

Vincient Walker Signature:



Certificate Number: 3956.01

Page 4 of 4



Page 1 of 3

The Measurement & Calibration Centre Certificate Number: 711801 Customer Ref: Simon Batchelor 3 October 2018

McConnell Dowel Constructors Limited 256 Puhinui Road Papatoetoe Auckland 2025

Attention: Simon Batchelor

### Calibration Certificate – Nuclear Moisture Density Gauge

Description A gauge for measuring the compaction and moisture content of soils. Manufacturer Humboldt. Model H5001EZ. Identification Serial number 8116. Date of Examination 2 October 2018. **Basis of Examination** "Methods manual section 5.32a.01". NZS 4407: Test 4.2.4 1991 Calibration of a Nuclear Surface Moisture-Density Gauge using five standard density blocks and two standard moisture blocks. The blocks have calibrations that are traceable to national standards. The gauge calibration is valid for the density range 1778 to 2706 kg/m3. The density and moisture calibration was checked both on arrival and after final calibration. The gauge was fully serviced to restore factory mechanical and electrical settings before the final calibration. To maintain compliance with this standard the gauge must be calibrated at least every two years or after major repairs.

Report prepared by:

Calibration Technician

Project Director:

Report checked by:

Agneio Vaz Dimensional Measurement Specialist

Approved Signatory:





IANZ Accreditation no 587

Please do not reproduce this certificate except in full.

19-23 Morgan Street, Newmarket, Auckland | PO Box 9360, Newmarket, Auckland 1149 p +64 9 356 3510 | calibration@themcc.co.nz | www.themcc.co.nz

### **Results:**

Due to the effect of chemical composition or site conditions, the calibration equations derived from the standard blocks may not be applicable to all materials. The standard test method does not give guidance as to what constitutes a separate material type for which a different calibration is required. It is expected that each user will determine which materials need separate calibrations, based upon experience and field conditions.

### **Density:**

The gauge calibration has been verified on a Limestone block. The density of the Limestone block is 2233 kg/m<sup>3</sup>.

The expanded uncertainty of measurement of the laboratory calibration expressed at the 95% confidence level is:-

Backscatter Mode ± 50 kg/m<sup>3</sup>

Direct Transmission Mode ± 27 kg/m<sup>3</sup>

The coverage factor is 2.

### Moisture:

The gauge calibration has been verified on a Magnesium block with zero moisture, and a composite block of Polyethylene and Aluminium, allocated with an equivalent moisture content of 499 kg/m<sup>3</sup>. The expanded uncertainty of measurement of the laboratory calibration expressed at the 95% confidence level is  $\pm$  19 kg/m<sup>3</sup> at 500 kg/m<sup>3</sup> and  $\pm$  5 kg/m<sup>3</sup> at zero moisture. The coverage factor is 2.

### **Environmental conditions:**

Temperature  $20^{\circ}C \pm 0.5^{\circ}C$ Relative Humidity  $55\% \pm 5\%$ 

### **Table Definitions:**

CR - is the ratio of the counts at 1762 kg/m<sup>3</sup> and 2243 kg/m<sup>3</sup>.

PREC - is the repeatability of the gauge at a 68.3% confidence level for the 1 minute period.

CE - is half the difference between the Granite and Limestone equations.

RMSE - is the RMS value of all the types of errors (PREC and CE) and an estimated Void error.

UNITS: SI THE MEASUREMENT & CALIBRATION CENTRE

\*

e - 1

GAGE MODEL:	H5001E2	SER:	8116		CALIB DA CALIB BA	ATE: 02/3 AY: 1	10/2018
SOURCE TYPE: SERIAL:	GAMMA 3650Cz	NEUTRON 495-11		STD	COUNT:DE MO	NSITY: STURE:	2979 454.8

\*\* DENSITY CALIBRATION DATA \*\*

DEPTH	MAGNESIUM	MAGN/ALUM	ALUMINUM	LIMESTONE	GRANITE
	1778	2213	2706	2233	2644
BS	1415.4	994.3	713.6	857.1	705.4
50	4577.6	3179.0	2149.5	2761.1	2115.9
75	4472.0	2970.8	1868.7	2556.9	1842.4
100	4244.6	2683.4	1592.4	2287.3	1550.5
125	3892.6	2356.0	1323.1	1987.4	1288.5
150	3486.9	2021.1	1078.8	1677.6	1050.6
175	3034.9	1681.6	855.7	1382.5	834.3
200	2571.3	1361.4	666.4	1112.4	650.9
225	2129.4	1079.8	516.8	881.1	503.4
250	1747.4	856.2	401.1	694.8	394.4
275	1401.5	664.8	317.6	536.6	309.4
300	1112.6	525.3	254.7	420.2	246.8

\*\* DENSITY PERFORMANCE at 2000 kg/m^3 [125 pcf] \*\*

DEPTH	A	B * 1000	С	CR	PREC	CE	RMSE
BS 50 75 125 150 175 200 225 250 275 300	3.29796 8.52621 9.20862 10.79737 11.76379 12.69810 13.64019 14.67474 15.84664 15.82328 17.18139 14.81981	1.28376 1.05011 1.05248 1.17043 1.26144 1.36810 1.49079 1.63357 1.79614 1.91089 2.10691 2.16638	-0.11932 -0.14817 -0.01817 -0.00771 0.00755 0.00783 0.00089 -0.01066 -0.02309 -0.02395 -0.03363 -0.03084	1.85 1.66 1.66 1.76 1.83 1.93 2.05 2.19 2.37 2.51 2.76 2.83	8.57 4.55 4.12 3.84 3.70 3.65 3.67 3.76 3.93 4.18 4.56 5.12	53.2 40.4 36.8 30.1 29.2 30.2 29.5 28.3 25.4 27.0 25.1 26.0	55.9 41.4 37.7 31.1 30.1 31.1 30.4 29.3 26.6 28.3 26.7 27.9

\*\* MOISTURE CALIBATION DATA \*\*

		LOW W 0.0		HIGH 499.	W 0				
		20.9		308.	. 0				
* *	MOISTURE PI	ERFORMANCE	at	160	kg/	′m^3	[10	pcf]	**
	E .	F*1000		CR		PREC	C R	MSE	
	0.04469	1.26506		3.08	-	4.6		0.3	

### 9 WARRANTY

The purchase of this equipment includes a limited 12 months warranty against defective material and workmanship. The owner may replace defective parts in the field by prepaid shipment for installation.

Equipment shipped prepaid to the factory will be repaired or replaced at the option of HUMBOLDT and returned prepaid to the customer. This warranty does not apply if the product as determined by HUMBOLDT, is defective because of normal wear or accident or misuse, or as a result of service or modification by other than an Authorized Service Facility.

THIS EQUIPMENT CONTAINS HAZARDOUS RADIOACTIVE MATERIALS AND THE PROPER USE OF THE EQUIPMENT AND PROTECTION OF FACILITIES AND PERSONNEL IS SOLELY THE RESPONSIBILITY OF THE PURCHASER. OWNERS AND USERS ACCEPT RESPONSIBILITY FOR COMPLIANCE WITH LOCAL AND NATIONAL LAWS COVERING THE POSSESSION, USE AND DISPOSAL OF THE MATERIALS.

THERE ARE NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS, WHICH EXTENDS BEYOND THIS DESCRIPTION. THIS EXPRESS WARRANTY EXCLUDES COVERAGE OF AND DOES NOT PROVIDE RELIEF FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND OR NATURE, INCLUDING BUT NOT LIMITED TO LOSS OF USE, LOSS OF SALES OR INCONVENIENCE. THE EXCLUSIVE REMEDY OF THE PURCHASER IS LIMITED TO REPAIR, RECALIBRATION OR REPLACEMENT OF THE EQUIPMENT AT HUMBOLDT'S OPTION.

Specifications and descriptions are as accurate as possible. HUMBOLDT reserves the right to make changes and improvements in accordance with the latest specifications and design improvements. Upgrading of older equipment to current specifications will be made, where possible, at the expense of the current owner except where HUMBOLDT may elect to make the upgrade at no cost to the owner.

			HUMBOLD	T SCIENTIFIC	C, INC. ATE	
This document should be	e retained b	by the owner of this o	levice as it	contains info	ormation pertain	ing to the required leak testing of radioactive
Licensee's Identification				ources.		
Contact Name: Michelle S	immons					
Company Name: McConnel	Dowell Co	Instructors Ltd				
Address: 4664 Airop	oort Rd, Tat	unie, Industrial Park	Pago Pago	American C		
Country USA			· •50, • agu	American Sa	ammoa, 96799	
Tel: (	634)699-22	239				
License No.: I	Vot. Regd.					
Sampling Date:	3/12/2024					
Device Identification:						
N	/lake:	Humboldt	Model:	5001	Sorial No.	1000-
Sealed Source Identification	••				Seriar NO.:	10291
Cance Cource Identification	<u>1:</u>					
adioisotono		Source (1)		Source (2	2)	
erial No.		CS-137		AMBE24	-/ 1	
		Q2262		K797-21		
esult of Leak Test:						
alibration Date:		BETA/GAMMA			ALPHA	
alibration Constant (pCi/cpm):		3/13/2024			3/13/2024	
ackground Measurement (cpm	):	1.51			1.88	
mple Measurement (cpm):		70			0	
movable Activity (uCi):		0.00E+00			1	
easurement Date:		3/13/2024			0.00E+00 3/13/2024	
Pasurod Rus		K Davonnew			5/15/2024	
easured By:		K. Davenport				
easured By: nature: 74: Plan		N. Davenport				
easured By: nature: <i>JA: Plan</i> s certifies that the leak test re-	sults are:	K. Davenport				
easured By: mature: <i>JAPPA</i> is certifies that the leak test re	sults are:	Less than 185Bq			[]	Graates they doop in
easured By: mature: 74: 1999 s certifies that the leak test re	sults are:	Less than 185Bq (0.005 uCi)				Greater than 185Bq (0.005
easured By: nature: <i>JAP Production</i> s certifies that the leak test re	sults are:	Less than 185Bq (0.005 uCi)				Greater than 185Bq (0.005 uCi)
easured By: nature: <i>JAPPA</i> s certifies that the leak test re-	sults are:	Less than 185Bq (0.005 uCi)				Greater than 185Bq (0.005 uCi)
easured By: nature: <i>JAP Plan</i> s certifies that the leak test re-	sults are: rces with re	Less than 185Bq (0.005 uCi) emovable activities g decontamination or	reater than disposal. A	0.005 (5.0E- uthorities m	-03) uCi (185Bq) nust be notified	Greater than 185Bq (0.005 uCi) be removed from service for repair and
easured By: mature: Jun Phase is certifies that the leak test re-	sults are: rces with re	Less than 185Bq (0.005 uCi) emovable activities g decontamination or	reater than disposal. A	0.005 (5.0E- uthorities m	-03) uCi (185Bq) hust be notified.	Greater than 185Bq (0.005 uCi) be removed from service for repair and
easured By: snature: <i>JA: Pha</i> is certifies that the leak test re-	sults are: rces with re	Less than 185Bq (0.005 uCi) emovable activities g decontamination or Hur	reater than disposal. A <b>nboldt Scie</b>	0.005 (5.0E- uthorities m	-03) uCi (185Bq) nust be notified.	Greater than 185Bq (0.005 uCi) be removed from service for repair and
easured By: nature: <i>JAPPA</i> s certifies that the leak test re-	sults are: rces with re	Less than 185Bq (0.005 uCi) emovable activities g decontamination or Hur 2525 Atlanti Tel: (212) s	reater than disposal. A <b>nboldt Scie</b> 32,6500	0.005 (5.0E- uthorities m ntific, Inc. igh NC 2760	-03) uCi (185Bq) hust be notified.	Greater than 185Bq (0.005 uCi) be removed from service for repair and

### Density/Moisture Gauge Calibration Certificate

(Nethog a	and the second	-	1000	NARABAN MA	a new balls
-	UF	MB	O	LD	T

Humboldt Scientific, Inc.

2525 Atlantic Ave. Raleigh, NC 27604 USA T: 1.800.537.4183 F: 1.919.833.5283 www.humboldtscientific.com

2024

111.6 326.8

Calibration Certificate Number: 202292174648 Rev 1 Customer
Supplement to Calibration Certificate 202292174648. This certificate supersedes Calibration Certificate 202292174648. This certificate supersedes Calibration Certificate 202292174648. Revision was made to present the expanded uncertainty in 2 significant figures. Name: McConnell Dowell American Samoa Ltd
Address: Tafuna Industrial Park, PO Box 4664
Pago Pago American Samoa 96799
Cauge Procedure: HCP003, AASHTO T310, T355, ASTM D2950, D6938, D7013, and D7759

its:	SI			Calib Date:		3/25/
uge Model: ial Number.	HS-5001EZ2 10291			Expiration Date Calib Bay:	r	3/25/
urce be: ial:	Gamma Q2262	Neutron K797-21		Density Standard Moisture Standard	Count: Count:	3
	De	ensity Counts	Calibration	Data		
Depth (mm)	Maanesiur	n Maan/Alum	Aluminum	Limestone	Granite	

719.3 1450.3 1005.3 721.5 843.6 BS 2235.5 2271.9 2787.2 3369.5 4832 50 1965.9 2536.5 1965.7 3129.8 75 4708 2256.7 1662.7 1670.9 2840.3 4496.5 1384.1 1402.7 1950.6 4149.1 2491.8 125 1137.7 1632.8 1111.5 2132.2 3720.6 150 888.9 1333.1 1767.1 914.2 175 3252.9 695.4 702.5 1073.4 1436.3 2758.2 200 537.2 545.3 850 1144.5 225 2312.9 663.7 417.3 423.4 898.2 1901.2 250

704.2

557.2

### **Moisture Counts Calibration Data**

332.5

264.1

Magnesium Al/Poly 14.6 224

Calibration Performed By: Vincient Walker

1530.3

1222.6

Function: Quality Team Member Signature: Vincient Walker



329.9

264.4

513.8

413

Page 1 of 4

275

300

Ga Sei Sc Tyj

> 22 May 2024 5:38:54 pm Tafuna Tualauta County Western District

### Leak test for our three NDM gauge

Ben Maraivalu To Tamla Warren Cc Craig Wrigglesworth i) If there are problems with how this message is displayed, click here to view it in a web browser. MG\_4371.jpeg MG\_4370.jpeg MG\_4367.jpeg MG\_4369.jpeg

2 MB

1 MB

Hi Tamla,

1 MB

Just letting you know we have sent 3 leak tests through for analysis . Should be there sometime this week . attached is the information required

1 MB

This is urgently needed to support our letter to NRC

Many thanks,

### Ben Maraivalu He/Him

Project Engineer - 2054 Pago Pago Runway 5-23 Rehabilitation work

M°Connell Dowell

Pago Pago , Pago Pago US Territory 96799, American Samoa M: 16842586452 | P: 16846992239 | E: Ben.Maraivalu@mcdgroup.com









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	Max	Tal.	, , , o au	1:30pm	Hape
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2021	Max	Tahiras Walker		0.55pm	Custon
28-Map		Custons.	1:50pm	3:0504	Kunt
, 2021	Max	TARya.	8.111	D. spr	puero
25-Marz	Max	Castons.	0:49 gu	9:36 9m	Custo
		10gillica	1:26 pm	7:2:1	1/
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UI-ADY-21	11/12	0 0 10.	30 am 1	isopn H	34
ingr-u	Mux.	Pavaran 8:	38 an. 9	: 25 qu Ron	isu
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OT-Apr-21	Max	Tavarar .	1:45 am	8:43 au RV	n
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Ary Ary all	MAX	Fagaing Poure	10.25	11:45	HORY
0x - 141 - 4	0040	ols new Road.			TUMPING
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DOTE	TIME OUT	The T
la Aug 21	5:00 am	TUDE IN CLIENT LOCATION LIST
- Jer Aug		100 pm. Taranount Ofn Dian
18 Amg-21	11:15 am	12105 Company Airport. Max 1
- alu		KSPH Vator Mar
- in order	12:50 pm	MOpen 8
20 Aug -		Garamount Anport max
- mg-y	Titspn	2:35 prin Homey Apron
23 Aug 21	12100	Trucking Regains Max 4
	coopm.	120pm ASPA Francis
31-Aug-2	5 300 am .	to:02 a Road cut. A
- 01-Sep.21	6.10.0	* privamant of Max 4
	@180 9m	5:00 pm proving Apro14.
02-5-9-2	8:40 m	10:17 gm Bt T Lagar
57-See 2	7 7.845 -	10: 10 m Construction Gym.
+ 08 Sep-2	9:15 200	5:25 pm Brew Transle Mink 4
-09-89-2	1 9:30 am	11:55 am Happy . Frighting Max 4
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ITopa	· · · · ·	Branch Retter Mary 4
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-15 San 21	11:30 am	3:47 pm BTZ Hovaran Mine &
10-squal	1.0.	Consportion Max Us
23-Sep-21	8:25 am	10:47 am 1810 - yesosofo, Mata
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-The de la	10:35am 1	1530pm Cristmuchion
1 15m21 1		

PIOLE:	TIME OUT	Time IN	CUAL	1			
8-04-4 	10:15am	4:52 pm	etc.	Tution Tution	LISER	Non	
29-54-21	10:20 am	2'21pm	Construction	- 191	max	4825	
1-0+21	1600 gm.	11:15 04	Construction	tutige .	max	4821	
14-007=2	11:30 01	11-13 -112	Sunguli Construction	Falenia.	Max	4828	900
13-Oct-2	11 sed	2:36 pm	ASPA	Neuruli;	Max	48-25	
1001	1.54 pm	3:17 pm.	Westland	Hoville:	max 4	1828	
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19-04-	2 8:50 am	9:20 am.	Customs	Tafung	Max 48	FZ	
20-0 of -	21 1:55 pm	2:20pm	Westland 5 Construction LAS	Hoville K	uax 48	21	
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sod-	2 Gelson m	10:38 m	castons T	apris 1	max 482		
29-04-2	2:05 pm	3:47pm.	Wes fland construction	toville. 1	uax 48	12	
16-04-2	11:40 am	12:29 pm-	HSPB.	Airport.	Max 4	52	
7-Ocpi	1:55 pm.	2: Hepm.	alestanch Construction.	offorille.	Max 4	18.57	
Nov-21	1:58 pm	3:10 pm	West and	staille.	max 4	fret	
NV-21	9:10 am	11:48 am.	19892 .	Murili.	nax	4828	
			ASPA in	Numlit	max	482	
10/211				a comatoria ana	idean.	1	

2020 TIME IN - TIME Dut - CLIENTS - 8:00 pm - 1:50 pm Westland BAE 3-teb-24 - 8:00 Am Non usop -Max 4828 3-Feb-24 - 10:10 mm - 12:05 pm - Nang Max J828' :- Feb - 24 - 12:37pm - 2:48pm - Vailuu - Max 4828 - Feb - 24 - 12:47 Pm - 2:30 PA - NANAS - MAX - 4828 Mar-24 - 9:08 xm - 11:58 pm Nanas - Max 4828 Mar-24 - 8:00 pm -10:55 Am -Nonas - Max - 4825 8:05 Am - 10:11 Am - Nava's - Mara -(coc) 144-24 - 7:35+1 - 9:40 Am - Silva - Vuax. -44.58 Mar-24-8:45-11:50Am-Noah - Max-4828 (Kobart) Mar-24 - 7:38an - 10:15An - Salva - Max 2002 1pr-24-10:21 Am-12:54 pm-NOBA - MARX - 4828 yr-24 - 11:03 Am - 1:15pm - SINa - Max - 4828pr-24 - 2:55pm - 4:00pm - Westfand - Max ton - 4828 pr-2+- 8:10 pm - 10:20 - NOAA - MAY UMA- 4828. 3pr-2f - 11:024m - 12:45pn - Wesfland - Max Juma-4828 3pr-24-3:32pm 4:27pm - Wosfland - Max - 4828



22-May-24 - 10:45 pm - 4:16 pm - Amport-Ben - 452 ?? 71 21-May-24 - 3:50pm - 6:05pm - Auport-Ben/william - 10271 03-Jan-24 - 5:00pm - le: 30pm - Amport - Ben - 10291. 04-Jun-24 - 2:16pm - Auport-Ben - 10291. 14 ans 24 4. age Anna Ben WZay 17-Jun-24 - 8:23 am -Tony 17 Jun 3.00 - hima. 18 - due 1020 Amp 2.00 Bo way Ammy Ba 2:291 user. 19-6-22 Huyne 7 Jog 2054 NOW Ben M 10 2ay 22-6-22 Aunt Job 2054 Ben 11 10204 5-7-24 Airport Dob 2054 7-8-24 VVV Dob 2054 10294 William T. long Ben 07-10-24- 7:37 am - 10:030m - Vailur - MAX. 10204 10291 1:03 pm - Aigant Job 12054 williamt. 7-12-24 10291 VVV Ben 7-1624 1.03n V 10294 Ben 7-26-24 1.00 V 10291 V V Williamt. V 7-27-24 12:32 pm VV 10291 Ben 7-30-24 3.63 m V 10291 MAX WH 8-02-24 - Kurpot 2:00pm - Tafuny - Jmp - may. 111054 8-09-24 10:02 A. - OPA - MEX - 4:0TA \$-09-24 Argort PIA- KON 10291 1:30pm . ~ V 8-13-24 4.00 3.30 - 4.54 Auport los withan 10201 8-16-24 maxlying 1:45pm - 3:54pm - Aug. 8-26-24

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	DATE	TIME OUT	TIME IN	CLIENTS	LOCATION	USER	NDM#	
	27 Aug-2	10:45	7:10 pm.	ETE	Land.	naaxe .		
	n.sep-24	9:38 Am - 3 W m	11:12 Am-	NANAIS CONST - DRA	LEONE	MAX Ben.	10291	
	10500 24	2:00 pm 3:17 m	Giocopm 5:20 pm	PRA uppts PRA HPts	Runway	William William		
	02/04-24	9:03an 10:48an	10:10 Am 11: 50 Am	Westlandyph Willis Ipnt	Officille Malasimi,	Max	10291	
	02-0ct-24 08-0cf-24	3:20 pm	4.01 pm	DPA 10 pts Willis Const.	hunnan Malaeimi.	Lima- max	11	
	4/10/24	12:35pn 10:20 Am	3:3 kp	Hy It Const -	Varia. Varia.	Max Max	<u> </u>	
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09-Nov-21 8:50 an 12:55 pm CTC, POWATAI. MAX: 814
12-Nov-21 9:00 and 1:40 pm CTC PANairai. Max 8114
18-Nov-21 Marson 31/2000 CT2 Thilli. Max. 8116
19-Nov-21 9:25an 2: 55pm CTC Flill: Max. 8110
26-Nov-21 72: Sopm. 1: 42pm. Westland. Offervalle. Max: Stile.
30-Nov-al 8:15-m 12:20pm Construction Truthiger & Max Stille
37-Dec -21-7:30 am. 1:45 pm. Lightwise Acirocut. Marke: 84Re
25- Marzz JANI 2030 pm DPW - Wapusaga Maxin Sika
105 traff: 60 and 12:09 pin. 45PD. Hisport nux 45.5.1.
econt 1.55 pm : 2.: etepm. outfland effortle. nur c.5.25.
North [1555 pin 3:16 pin 1. institut that the nux the
ive 7:0 and 11: 48 and 118 part . Manuali near 4826

DOTE: TIME OUT: TIME IN CLIENT: LOCATION: ULER: NE 17: Jan 22 9: 40 am 10: 50 am Westland Offorulle. Max 811 28: Jan 22 10:35 am 12: 20 pm Westland Offorulle.
29-Jan 22 7:50 an 9:36 am Happy Fagging Max 8116 Difference And Anther Anthe
10 Feb-22 8:50 an 9:38 an. Happy Utulei. Max - 8114 II-Feb-22 8:50 an 9:37 an. Happy Utulei. Max - 8114
16-Feb-22 7: 24 gm 8: 37 gm Happy Fagaing Max. 8116 17-Feb-22 10: 14 gm 11: 24 gm Faynage: Andrew 811 17-Feb-22 10: 14 gm 11: 24 gm Faynage: Andrew 811
18 Feb 22 8:55 am 9:48 an Hapy Fragaina Mate 8111 He-Mar 22 1: 50 pm 2:47 pm Impex Parairai Max 8111 Gonstruction: Ele School F7-Mar 22 7:50 am. 11:49 am. RW 3 Sons Annu Max 8111 Construction: Island. Kasa.
17-Mav-22 1:10pm 1:55pm. Paramain + Airport Max 8111 28-Mav-22 10:52am 12:00pm. Westland ottorille Max 811 Construction Los peuple.
29-Mar-22 10:20 gm 11:15 gm Impex Pavairai Max 8114 Construction Ele School 21-Mar-22 8:50 gm 7:148 gm Westland Offoville Max 8111
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- True Dut Time To	$ C_{10} $
pr-22 12:55 pm 1125 pm.	Paramount Arrport Max 814.
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DATE TIME	Out THEFT	10000
24-Apr2 8:00	m Z'bogn	· Paramount Of Attac
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27-Am2 9:00	am. 10:13 am.	anstruction LDS Temple DPW Mapusagg Max 8110
17-Apr 22 10:30 0	am 11:18 am	Nana's Fagatap Max Islu
27 Apr-22 1:10 pr	n 2:00pm-	Paramount. Au port Max. SIR
28-1-12 3:05p	in 3:43 pm.	- Westland Offerille Max STIL
28 Apriz 3150	m. +:12pm.	DPW Cardinal max Elle
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02 May -2 7:5 02-May -2 10:50	8am 9:20 am. 92 11:02 am	Company Alipert Marcalle Farcinesunt Airport Nax Elle Company Apron. DPW. Napusaco Max Elle Road.
02 May ~2 7:5 02-May ~2 10,50 04-May 22 7:35	Ram 9:20 am. Am 11:02 am am 9:12 am	Company Airport (Ruden) Parameunt Airport Max Isla Company Apron. DPW. Mansacp Max Bille Road. Nava's Fagatogo Max 8/102 Construction: Court Marke
02-May -22 7:5 02-May -22 10:50 04-May -22 7:35 04-May -22 10:53	Ram 9:20 am. am 11:02 am am 9:12 an 3 am 12:03 pm	Comparing Airport (Marken) - Farcinosunt Airport Marken - Cempany Apron. - DPW. Magusacon Marken - DPW. Magusacon Marken - Nama's Fagatogo Marken - Westland Offor ille.
02-May-22 7:5 02-May-22 10:50 04-May-22 7:35 06-May-22 10:53 06-May-22 3:10 p	8am 9:20 an. 920 an.	Company ( Airport ( Makes) Farcinosunt Airport Nax Eslie Company Apron. DPW. Napusacon Nax Eslie Road. Mana's Fagatogo Nax Eslie Construction Court Nonse - Westland Ottoville. Max Eslie Construction LDS Tomple. Paramount Airport Nax Eslie Company - Apron. - DAVA' (a' Max 8/16)
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02-May -22 7:5 02-May -22 7:55 04-May -22 7:35 04-May -22 10:53 04-May -22 3:10 pm :10-May -22 11:50 10-May -22 12:55	Ram 9:20 an. 922 an. 923 an. 92:12 an. 9	Comparing Arron. Farcinosunt Airport Marciella Comparing Apron. DPW. Warusage Max Bille Road. Mana's Fagatogo Max Bille Construction Court Monse - Westland Ottorille. Max Bille Construction. LDS Jample. Rammaint Airport Max Bille Construction. LDS Jample. Paramaint Airport Max Bille Construction. Inogex Pavaira: Max Bille Construction. Inogex Pavaira: Max Sille Construction. EAN Construction. EAN Construction.
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02 May 2 7:5 02 May 2 7:5 04-May 2 10:53 04-May 22 7:25 04-May 22 10:53 04-May 22 11:50 10-May 22 11:50 10-May 22 12:55 10-May 22 2:10pm	Ram 9:20 an. The 11:02 and am 9:12 an am 9:12 an am 12:03 pm n 2.50 pm am. 12:00 pm am. 12:00 pm am. 12:00 pm am. 12:00 pm	Company Apron. Parciment Arport Verk Elle Company Apron. DPW. Nagusard Wax Bille Bard. Mana's Fagatogo NAX 8/16 Construction Court halse Westland Otorille. Max 8/16 Construction LDS Tomple. Paramant Arport wax 8/16 Construction. Panamant Arport wax 8/16 Construction. Panama Pana'ra' Max 8/16 Construction. Max 8/16 Construction. Construction. Construction.





### CERTIFICATE OF CALIBRATION



S.E. INTERNATIONAL, INC. 436 Farm Road P.O. Box 39 Summertown, TN. 38483 Ph: 931.964.3561 Fax: 931.964.3564 www.seintl.com | radiationinfo@seintl.com

Certificate Number: 24-1901 CAL DATE: 7/23/2024 CAL DUE DATE:7/23/2025

### **Customer Information:**

Humboldt Scientific, Inc. Tamla Warren 2525 Atlantic Ave Raleigh, NC 27604 USA

Monitor 200 SN# M105151

### Instrument Information:

Instrument: Radiation Alert Type: GM Alarming Rate Meter Model: Monitor 200 Serial: M105151 Make: LND Tube Model: 712 Detector: Internal Input Sens: 2.4VDC Inst Voltage set: 316VDC

Contamination Check: Alarm Check: 🖾 Audio Check: 🖾 Mechanical Check: 🖾 Battery Check: 2 3.20VDC Tolerance: 🖾 ± 10% 🗆 ± 20% 🛑 Out of Spec

### Calibration Data:

S.E. International, Inc. Certifius the above described instrument was calibrated in a known radiation field using a Cs137 (663/keV) beam calibrator. Transfer instrument MDH Industries, Model 2025 X-Ray Monitor, S.H. 4351, with 180:co Probe, S.N. 7773. Calibration is traceable to NIST DG8646/87. GM detectors are positioned perpendicular to source. This calibration conforms to AMSINCSL 2540.3.2006, ISO 17025, AMSI N322-1978 and the interim guidelines of the Canadian CNSC Regulatory Expectations for Calibration denomes to AMSINCSL 2540.3.2006, ISO 17025, MASI N322-1978 and the interim guidelines of the Canadian CNSC Regulatory Expectations for Calibration denomes to the results are tabulated below. Measurement of uncertainable to 5%. This certificate may not be reproduced, unless in full, without written approval from S.E. International, Inc. **TENNESSEE LICENSE# R-51002-C27** 

Precision/Constancy Check performed with Cs<sup>137</sup> Source s/n 010818 | Precision: 2 ± 10% ± 20% Constancy Check: 1 uCi of Cs<sup>137</sup> indicates 0.855 mR/hr

Reading 1:	0.859 mR/hr	Temperature: Relative Humidity: mmHg:	26.8 °C 48.8% 735.5	Notes: Dead Time is set at 9.000E-05 Gamma Sensitivity is set 1.1020 For more on the Dead Time and Gamma
Reading 2:	0.836 mR/hr			Sensitivity, see owners manual. Unit: "NEW"
Reading 3:	0.869 mR/hr			
Mean:	0.855 mR/hr			

Decade Range	Reference Calibration Poir	Instrument Meter Reading as t Received *	Instrument Meter Reading after Calibration *	Correction Factors for > +/- 10%
10 mR/hr - 200 mR/hr	160 mR/hr	152.2 mR/hr	152.2 mR/hr	None
10 mR/hr - 200 mR/hr	40 mR/hr	40.86 mR/hr	40.86 mR/hr	None
1 mR/hr - 20 mR/hr	16 mR/hr	16.67 mR/hr	16.67 mR/hr	None
1 mR/hr - 20 mR/hr	4 mR/hr	4.112 mR/hr	4.112 mR/hr	None
0.1 mR/hr - 2 mR/hr	1.6 mR/hr	1.717 mR/hr	1.717 mR/hr	None
0.1 mR/hr - 2 mR/hr	0.4 mR/hr	0.401 mR/hr	0.401 mR/hr	None
** = Range calibrated to elect	ronic standard   * indi	icates 1 minute average		

Cs137 Gamma 6810 Capsule S/N A-855 and Model 28-5A Calibrator S/N 10291 calibrated monthly for decay

Arb Gen. S/N Arb Gen no longer used during calibration Cal Date: NOT USED Cal Due: NOT USED Multimeter S/N 86820561 Cal Date:19 Dec. 2023 Cal Due:19 Dec. 2024

Flagd Haglen

Calibrated by: Floyd Hagler

		-	Checked by														
		-	Remarks														
	e date		Temperature														
egister	Calibration due	-	Average														
ey meter r		:	Reading 3														
diation Surv		•	eading 2														
Rac	Calibration Date		teading 1 R														
			Possition / Location F														
	ster number (ID)		rest By														
	Radiation survey m		Date														



 KTP
 Key Technical Personnel (someone who is highly skilled and can sign reports)

 HS
 Highly Skilled

 P
 Proficient (Can work unsupervised)

 ST
 Supervised (Needs someone who is Proficient around, incase they have any questions)

 LTMK Little to No Knowledge (minimum experience on reading the standard and performing the test)

 11/5/2024
 Refresher required every 12 months

									McCon
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	Tort				alu		1 th	-Nuno.	
Section	Standard	Test Sheet	Reference	Item	ariave	ETEV	DAT	and the	ETEV
	Standard				anNo	ATE OMPL	<b>UPIR</b> <sup>X</sup>	ardino	ATE OMPL
					<u> / *</u>	050	- <del>5</del>	40.	0,00
Nuclear Gauge Safety					KTD.	August 12 2024	August 12 2027	ст	Octobor 18 2024
Nuclear Gauge Salety					KIF	August 13,2024	August 15 2027	51	OCIODEI 18,2024
USDOT HAZMAT									
refresher					KTP	June 30,2024	June 30,2027	ST	October 18,2024
					1.000				
RSO				KTP = Designated RSO	КТР	October 10,2024	No Expiry date		
				Determining the percentage of fractured					
	D5821	QC-T47	HSEQ-SOP002-GEN-ASTM-D5821	particles in coarse aggregate					
				Sieve Analysis of Fine and Course					
				Aggregate / Sand Equivalent - Calibration					
	D2419		HSEQ-SOP003-GEN-ASTM-D2419	of seives in SOP					
				Sieve Analysis of Fine and Course					
	C117 / C136	QC-T02	HSEQ-SOP006-GEN-ASTM-C117 / C136	Aggregate - Calibration of seives in SOP					
	a. (a	0.0 7/5		Organic Impurities in Fine Aggregate for					
	C40	QC-115	SOP12	Concrete					
Aggregates	C127	QC-117	SOP13	SG & Absorption of Coarse Aggregate					
	C128	QC-118	30P14	Signa Applycic of Fine and Course					
	C126	00 7020	SOB15	Aggregate - Calibration of serves in SOP					
	C29	OC-T19	SOP16	Unit Weight & Voids in Aggregate					
	C566	QC-T20	SOP17	Total Moisture Content					
	C207		SOP18	Missing				l	
	C75		SOP19	Missing				1	
	D4791	QC-T21	SOP20	Elongation of Coarse Aggregate					
				Material Finer than 200 Sieve in Mineral					
	AASHTO T11	QC-T53	SOP51	Aggregate by Washing					
	D140		SOP21	Missing					
				Maximum Theoretical Density of					
	D2041	QC-T42	SOP22	Bituminous Paving Mixtures					
	D2726	QC-T39	SOP23	Marshall Block / Bulk SG & Density					
	D2950	QC-T40	SOP24	Density by Nuclear Method					
	D3203	QC-139a	SOP25	Marshall Block / Percent Air Voids					
Ditumen	D3665	QC-141	SUP26	Missing					
bitumen	D5444	00-T38a	SOP27	Quantitative Extraction of Binder (Mix 20)					
	D6926	QC-T58	SOP29	Missing					
	00520	QC 150	56125	Marshalll Stability & Flow of Bituminous					
	D6927	QC-T46	SOP30	Mixture					
	RR D04-1025		SOP50	Missing					
	D546	QC-T23	SOP54	Sieve Analysis of Mineral Filler					
	D979	QC-T59	SOP55	Missing					
	C109/C1019	QC-T56	HSEQ-SOP005-GEN-ASTM-C109 / C1019	Grout Speciment Strength					
				Use of unbonded strength Caps - LOG					
	C1231	QC-T57	HSEQ-SOP007-GEN-ASTM-C1231	SHEET for pad uses required					
	C231	QC-T28a	HSEQ-SOP008-GEN-ASTM-C231	Concrete Test Request					
	C511	0.0 700	HSEQ-SOP009-GEN-ASTM-C511	Missing					
	C017	QC-130	HSEQ-SOPOID-GEN-ASTMI-C017	Making & Curing Field Concrete Tect					
	C31	00-T28	SOP31	Specimens					
	C138	QC-128	SOP32	Missing					
	0150		50152	Compressive Strength of Cylindrical					
Concrete	C39	QC-T27	SOP33	Specimens				1	
	C143	QC-T28a	SOP34	Slump				1	
	C172	QC-T29	SOP35	Unit Weight of Concrete					
	C173		SOP36	Missing					
	C1064	QC-T28	SOP37	Temperature of Concrete					
	C42	QC-T31	SOP38	Drilled Cores & Sawed Beams					
	C78	QC-T32	SOP39	Flexural Strength by Third-Point Loading					
	C805	QC-T27	SUP52	Concrete Rebound Hammer Test					
	C873	00-737	SOP53	Concrete				1	
	C073	QC-137	50155	Straightedge			<u> </u>		
Pavomont	E1705	QC-151	SOP50	Texture Denth					
i avenient	D7127	0,01170	SOP58	Missing				1	
	D4643	OC-T14	HSEO-SOP001-GEN-ASTM-D4643	Moisture Content by Microwave Oven					
	D1883	QC-T09	HSEQ-SOP004-GEN-ASTM-D1883	California Bearing Ratio (CBR)	i			l	
				Density of Soil In-Place by Sand Cone					
	D1556	QC-T05	HSEQ-SOP011-GEN-ASTM-D1556	Method					
	D698		SOP40	Missing					
				Material Finer than 0.075mm(ASTN D1140-					
				17) & Partical Size Determination (ASTN				l	
	D1140	QC-T02e	SOP41	D6913M-17)					
	D4557	0.0 700	60012	Laboratory Compaction Using Modified				l	
Soil	D155/	QC-103	SUP42	Aliceing					
	D/211	OC T12	50F45	Liquid Limit Plactic Limit Placticity Index					
	04310	QC-113	50644	Material Finer than 0.075mm/ASTN 01140					
				17) & Partical Size Determination (ASTN				1	
	D6913	QC-T02e	SOP45	D6913M-17)				1	
	D6938	QC-T04	SOP46	Density by Nuclear Method				i i	
	D7012		SOP47	Missing				1	
	D2166M		SOP48	Missing					
	D2166		SOP49	Missing					

Checked against 'Testing Worksheet Templates Register'

nell Dowell AMSAN	1 Laboratory T	raining Matrix	(										
EPPENDATE	Matonasi	DATECOMPT	ETED EXPRESSION	WilliamTooala	DATE COMPLETE	tremont	AndrewHuress	DATE COMPLETE	tremont	Johnsanau	DATE COMPLETE	Experiodate	Lina fuavaa
October 18,2027	HS	October 18,2024	October 18,2027	Р	October 18,2024	October 18,2027	Р	October 18,2024	October 18,2027	HS	August 29,2024	August 29,2027	Р
October 18,2027	HS	October 18 2024	October 18,2027	Р	October 18 2024	October 18,2027	Р	October 18 2024	October 18,2027	HS	June 30,2024	June 30,2027	Р
		10,2024			10,2024			10,2024		HS	October	No Expiry date	
											10,2024		
L													

Joke Construction     Joke Construction       October 18,2024     October 18,2027       October 18,2024     October 18,2027       October 18,2024     October 18,2027       Image: Construction of the constr
Streeperform     Streeperform       October 18,2024     October 18,2027       October 18,2024     October 18,2027       Image: Streeperform     Image: Streeperform       Image: Streeperform     I
Street     Street       October 18,2024     October 18,2027       October 18,2024     October 18,2027       October 18,2024     October 18,2027       Image: Street Stree
October 18,2024     October 18,2024       October 18,2024     October 18,2027
October 18,2024October 18,2027October 18,2024October 18,2027IOctober 18,2024II<
0ctober 18,2024     18,2027       0ctober 18,2024     0ctober 18,2027
October 18,2024     October 18,2027       Image: Control of the sector of the se
Image: Product of the sector of the secto

Certificate of Completion Radiation Safety and Gauge-Use Course Apenisa Maraivalu Has successfully completed a certified course on radiation safety, transportation and the operation of nuclear gauges, complying with 49 CFR 172, Subpart H, alone with NITRFG 1556 and Arreement State Remixements Tonics covered	in this course include: Atomic Physics, Radioactivity, Health and Safety, Regulations, Transportation/HAZMAT, Radiation Safety Plan and Field-Use Procedures. Certificate Number: <u>RT1397</u> Completion Date: <u>08.13.2024</u> Hazmat Recertification required by this date: <u>08.13.2027</u> Malir Al-Mal	Additional training will be required from the Radiation Safety Officer to satisfy General Awareness, Function Specific, Safety (OSHA/EPA), Security Awareness and In-depth training equirements of 49 CFR 171.22 (g)(2) and 49 CFR 172.704 (a)(1), (2), (3), (4), and (5) for typical managers, supervisors and employees of hazardous material transportation.
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Certificate of Complete of Completion Radiation Safety and Gauge-Use Course and the operation of nuclear gauges, complying with 49 CFR 172, Subpart H, John Faam and Cauge OF Course of the operation of nuclear gauges, complying with 49 CFR 172, Subpart H, and the operation of nuclear gauges, complying with 49 CFR 172, Subpart H, and the operation of nuclear gauges, complying with 49 CFR 172, Subpart H, and the course include: Atomic Physics, Radioactivity, Health and Safety, in this course include: Atomic Physics, Radioactivity, Health and Safety in this course include: Atomic Physics, Radioactivity, Health and Safety in this course include: Atomic Physics, Radioactivity, Health and Safety in this course include: Atomic Physics, Radioactivity, Health and Safety in this course include: Atomic Physics, Radioactivity, Health and Safety in this course include: Atomic Physics, Radioactivity, Health and Safety in this course include: Atomic Physics, Radioactivity, Health and Safety in this course include: Atomic Physics, Radioactivity, Health and Safety in the course include: Atomic Physics, Radioactivity, Health and Safety in the course include: Atomic Physics, Radioactivity, Health and Atomic Physics, RadioActivity, Sacharhan Atomic Physics, Rad	www.humboldtscientific.com • 1.800.537.4183
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