Sercon Ltd, Europa House, Coppicemere Drive,
Crewe, Cheshire CW1 6GZ, UK
Tel: +44 (0)1270 580008
Company Registration No. 4290072 Vat No. 771 1100 74

11 – Installation Report

Client:	North Dakota State University		
Quotation Number:	183470	Date:	18/05/2026
Job Number:	IN1384	Date:	24/07/2026

Contact:	Kirsten Butcher	
Date of Visit:	09 -13 Nov 2026	No. of Days: 5
Engineer:	David Harris	

Details of visit:

Engineer arrived on site and inspected delivered boxes. No damage noted – All OK.
Unboxed instruments and setup on desktop. VerSA setup on top of CryoPrep as required – All OK.
Unboxed PC, setup on desktop.
Issue with power supply IEC cables to mains supply. Only cables supplied by Sercon were to 115V power outlets. Instrument has been built to 230V specifications (IEC c13 required for 230V power outlets). Adaptors ordered by customer but delivery delayed. Comms was able to be established with the units on 115V but unable to start vacuum pumps. Also no MFC/EPC or Furnace control. Unable to establish comms with VerSA. Facility electrician modified cables on 2nd day to correct socket type now in use. Comms established with all units.
Customer required back line plumbing installing. $^{1}/_{8}^{th}$ Stainless Steel tubing and fittings used. Engineer built lines, customer fitted to gas cylinders.
Software edited as required for bespoke unit layout.
CryoPrep set to node U also. Unable to reach Prep PCB due to lack of access to rear of CryoPrep. Altered all events to operate with node U command.
No issues with software. All components and controls are as expected – All OK.
Pumped down instrument. Turbo-pump speeds reached 93k RPM. Vac pressure of $6.1e^{-08}$ mBar achieved overnight. $2.4e^{-08}$ mBar achieved after tightening turbo pump connections after venting instrument on day 3.
Activated Ion source & fired filament. No issues – All OK.
User does not require Ref Gas on system. Closed Ref Gas He carrier flow to save on He usage. If Ref Gases are installed on system at a future date, engineer advises to set He carrier flow to 15ml/min.
Adjusted isolation valve crimps as required.
Peak shapes tuned from trapping loop via IsoEArth combustion method (AS Beet Mix samples used).
Magnet moved as required and system tuned for optimum linearity, sensitivity and peak shapes – All OK
N_2 & CO_2 2/1 Peak shapes all good – Pass
CO_2 2/1 stability check - Pass
N_2 2/1 stability check – 2/1 trace sloping indicating that the vacuum had not yet settled.
N_2 background with isolation valve open – Pass (approx. 9.0^{e-11} on major beam).
N_2 Blank peak – Pass (approx. 2.5^{e-10} major beam height)

Sercon Ltd, Europa House, Coppicemere Drive,
Crewe, Cheshire CW1 6GZ, UK
Tel: +44 (0)1270 580008
Company Registration No. 4290072 Vat No. 771 1100 74

11 – Installation Report

Client:	North Dakota State University		
Quotation Number:	183470	Date:	18/05/2026
Job Number:	IN1384	Date:	24/07/2026

During 1st DUAL precision batch testing N_2 yielded good results but CO_2 testing failed. This was due to CO_2 HT peak drift. Retuned as required. HT now stable.
During the second DUAL precision batch spiking occurred across all beams when in N_2 mode.
Instrument vented and source inspected. Adjusted components on Ion Source as required.
Returned Ion Source to MS and pump system back down.

CryoPrep

Setup CryoPrep system. No faults noted. Plumbed in connections between systems as required – All OK.

Fitted GC columns and baked out at 130°C overnight. No leaks noted post-bake out. Set GC oven to 30°C for analysis.

Demonstrated to users how to make up CryoPrep combustion tube and fit to system/furnace (1 tube damaged in process)– All OK.

Changed VerSA sample bed to 12ml exetainer function. 2nd 12ml rack missing for correct build of sample bed. Part to be sent out by Sercon. Adjusted XY coordinates as required – All OK.

Calibrated He flow meter – All OK.

User is interest primarily in CH_4, N_2O, CO_2 & N_2 analysis applications on the CryoPrep.

Peak shapes tuned from trapping loop via IsoEArth combustion method and copied over to CryoPrep Project.

Adjusted methods and timings as required to optimise sample retention – All OK.

Created and tested methods for 12ml exetainer size. Tested with samples from air for ^{13}C & ^{15}N . Tested with customer reference gas for N_2O & CH_4 analysis.

Due to a shortage of LN_2 and time restrictions due to earlier electrical power issue full batches not run.

Customer to run test batches on system at future date.

He Pressure = 12psi

Low He carrier flow flow = 15-20ml/min.

Flush He carrier flow = 60ml/min

GC1 He flow = 9.5ml/min

GC2 He flow = 2.5ml/min.

IsoEArth

Made up reaction tubes for IsoEArth. User has experience of making tubes from previous systems.

All tubes installed. System He leak checked – No He leaks present – Pass.

GC column baked out at 130°C overnight – All OK. Set to 60°C for analysis. Separation between N_2 & CO_2 – Pass.

Furnaces heated up to required temps. Temps stable. (Comb 1000°C, Reduc 600°C) – Pass.

Calibrated He flow meters – All OK.

He Pressure = 25psi, He flow = 60ml/min.

Sercon Ltd, Europa House, Coppicemere Drive,
Crewe, Cheshire CW1 6GZ, UK
Tel: +44 (0)1270 580008
Company Registration No. 4290072 Vat No. 771 1100 74

11 – Installation Report

Client:	North Dakota State University		
Quotation Number:	183470	Date:	18/05/2026
Job Number:	IN1384	Date:	24/07/2026

O_2 Pressure = 25psi, O_2 flow = 80ml/min.

Ran DUAL analysis for precision & linearity. Results good (see below for details) – All Pass.
Precision batch: AS Beet Mix (n=5, N=100µg, C=400µg, Ref - N=100µg, C=400µg).
Linearity batch: AS Beet Mix (n=6, N=10-200µg, C=25-500µg, Ref- N=100µg, C=250µg).

Results:

IsoEArth + HS2022

CO_2 2/1 Peak Shape = Pass
N_2 2/1 Peak Shape = Pass
AS Beet Mix ^{13}C Precision =0.024‰ S.D.
AS Beet Mix ^{15}N Precision =0.034‰ S.D.

CO_2 2/1 Stability = Pass
N_2 2/1 Stability = Pass (2/1 slopes)
AS Beet Mix ^{13}C Linearity =0.147‰ S.D.
AS Beet Mix ^{15}N Linearity =0.124‰ S.D.

Training

Gave overview of MS system and the component parts, (Flight tube, magnet, turbo pumps, gauges, etc)
Gave overview of GSL and component parts.
Demonstrated how to change source filament. This includes…

- How to power off Ion Source correctly.
- How to safely vent the instrument and monitor pump speed readbacks via Callisto.
- How to pump down instrument to correct pressure levels to condition filament.
- How to successfully condition filament and how long to allow system to out gas for.
- How to make up and fit reaction/scrubber tubes.
- Explained different plumbing setups on all systems
- How to leak check system and check background levels.

Gave training in Callisto usage. This includes…

- Navigation of Callisto & Reprocessor software
- Comms, settings and calibration functions.
- Overview of Bitmap, flow/pressure/temp readbacks and valve setup.
- Explanation on what the beams demonstrate and the isotopic ratio meanings.
- Scan functions (Peak shape, stability, background scans, etc)
- Method building (timings, events, reference files, etc)
- Demonstrated how to edit Event & timing files.
- Sample list building and saving of data.
- How to set XY coordinates and set Z depth within method building.

Sercon Ltd, Europa House, Coppicemere Drive,
Crewe, Cheshire CW1 6GZ, UK
Tel: +44 (0)1270 580008
Company Registration No. 4290072 Vat No. 771 1100 74

11 – Installation Report

Client:	North Dakota State University		
Quotation Number:	183470	Date:	18/05/2026
Job Number:	IN1384	Date:	24/07/2026

- "Normal mode" for data analysis. (System does not have Ref Gases installed for RGI mode).
- How to reprocess data and improve standard deviation/mean of gathered data.
- Location of data within PC, (original data vs reprocessed data locations. Raw vs drift corrected data).
- Preferred set up of Blank, Test/Ref, sample during a sample list.
- Explained the importance of the magnet position in the tuning of the beams.
- Advised on preferred daily peak shape/stability checks that should be performed on system before use.

Visit complete

Recommendations:

- Install Ref Gases for ease of tuning and stability checks.
- Check XY coordinates on VerSA sample bed if changing sample bottle type. Also check and set Z depth within method.

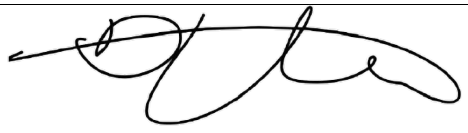
Faults and Shortages:

- IEC c13 required for 230V power outlets.
- 2nd 12ml exe rack for VerSA sample bed build.

Follow up:

N/A

Engineer: David Harris Date: 13th November 2026

Signed: 

Notes:

N/A