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Method EA027

ANC Corroboration by Chip Tray Incubation, as per the National ASS Guidance (2018)

Introduction

ALS is excited to announce the development of an **ANC Corroboration by Chip Tray Incubation** method, designed to authenticate the Acid Base Accounting provided by Chromium Suite (EA033) and/or SPOCAS (EA029) analyses. This will translate into reduced environmental disturbance as well as significant cost savings in large land remediation projects since liming can be a costly and time intensive process.

Traditional Chromium Suite and SPOCAS analyses determine the Acid Neutralising Capacity (ANC) of the soil, however they cannot measure its **effectiveness** under field conditions. By simulating field conditions Chip tray Incubation can demonstrate the **effectiveness** of the ANC.

The current **National Acid Sulfate Soils Guidance (NASSG, 2018**) recommends that ANC as determined by Chromium Suite or SPOCAS analyses should only be included in Net Acidity and Liming Rate calculations if the ANC has been corroborated by chip tray incubation. An incubation period of ≥ 9 weeks is recommended to ensure the soil pH has stabilised (Creeper *et al*, 2012).

Chip Tray Incubation is suitable for samples that have yielded a positive ANC result in Chromium Suite (evidenced by pH_{KCl} ≥ 6.5) or SPOCAS analysis (evidenced by pH_{ox} > 6.5).

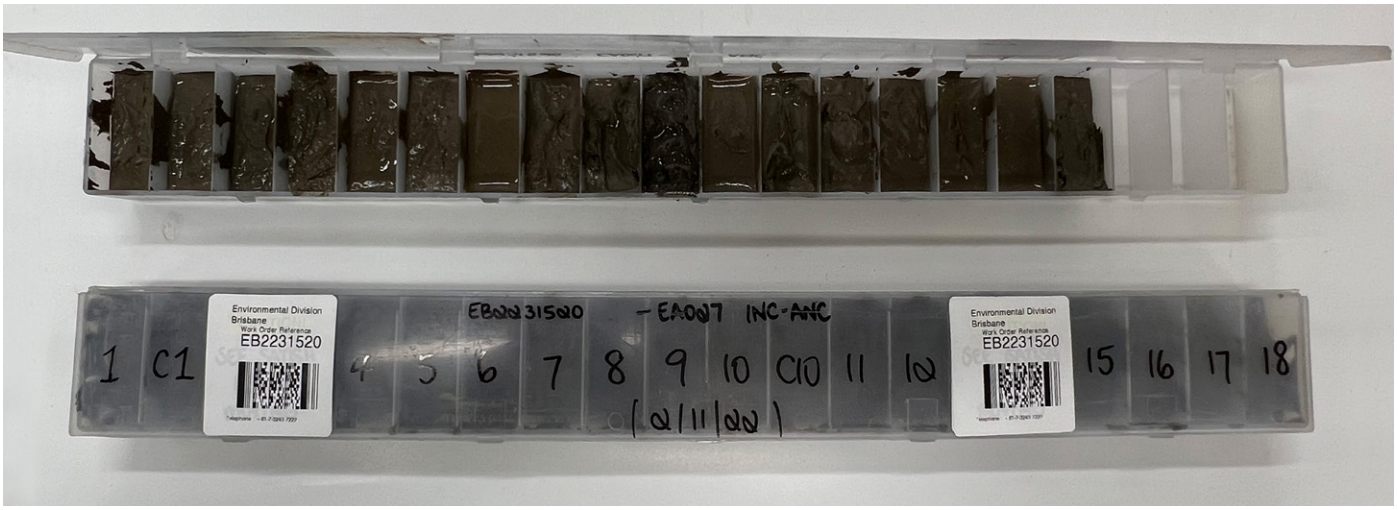
Purpose

To illustrate how corroborated ANC can save on liming cost, see the example below. The reduced net acidity and liming rate results outlined in green (including ANC) can only be applied if the ANC has been corroborated. Results outlined in red (excluding ANC) apply when the ANC has not been corroborated.

Method	Analyte	Units	LOR	Sample 1	Sample 2	Sample 3	Sample 4
EA033: Acid Base Accounting							
EA033	Net Acidity (sulfur units)	%S	0.02	<0.02	<0.02	<0.02	2.06
EA033	Net Acidity (acidity units)	mole H^+/t	10	<10	<10	<10	1290
EA033	Liming Rate	kg $CaCO_3$/t	1	<1	<1	<1	97
EA033	Net Acidity excluding ANC (sulfur units)	%S	0.02	0.57	0.90	0.89	2.23
EA033	Net Acidity excluding ANC (acidity units)	mole H^+/t	10	358	564	557	1390
EA033	Liming Rate excluding ANC	kg $CaCO_3$/t	1	27	42	42	104

Procedure

Moist soil (adjusted to near field capacity) is incubated aerobically at room temperature in chip trays for a period of 9 weeks. Soil moisture status is periodically monitored and adjusted if necessary to ensure that the moisture level remains at optimum level.



At the conclusion of the 9-week incubation:

- If the pHINC is ≥ 6.5, the ANC can be included in Net Acidity and Liming Rate calculations.
- If the pHINC is < 6.5, ANC should not be included in Net Acidity and Liming Rate calculations.

Results are reported in the following format:

Method	Analyte	Units	LOR	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
EA027: ANC Corroboration by Chip Tray Incubation								
EA027	pH (INC)	pH unit	0.1	7.2	7.2	7.1	5.3	6.5
EA027	ANC Corroborated			Yes	Yes	Yes	No	Yes

Sample Requirements

It is recommended that samples should be maintained frozen to minimize oxidation until Chip Tray Incubation can commence, to facilitate the most accurate results.

Hence, it is required to indicate on the Chain of Custody when Chromium Suite or SPOCAS is requested that additional volume has been provided specifically for EA027 **(ANC Corroboration by Chip Tray Incubation)** which may be required depending on the ANC results reported on the requested suites.

All samples from such work orders will then be maintained frozen until after the Chromium Suite (EA033) or SPOCAS (EA029) results have been released.
The client can then select samples for Chip Tray Incubation. These will be "re-batched" and the 9-week Chip Tray Incubation will commence.

References

NASSG
National Acid Sulfate Soil Guidance - Identification and Laboratory Methods Manual; Appendix B and C, pp 76-81 (2018)
https://www.waterquality.gov.au/sites/default/files/documents/identification-laboratory-methods.pdf

Creeper N. *et al*
A simplified incubation method using chip trays as incubation vessels to identify sulphidic materials in acid sulphate soils (2012)
https://bsssjournals.onlinelibrary.wiley.com/doi/10.1111/j.1475-2743.2012.00422.x