Supplementary Information

Total Chlorine Analysis

Method

The method used was an automated Combustion - Ion Chromatography technique commonly known as CIC at Intertek Commodities (West Jetty Immingham Dock, Immingham, North East Lincolnshire, DN40 2NT). The equipment used was a Mitsubishi AQF (Auto quick furnace) coupled with a Dionex DX120 Ion Chromatograph using 500 µl sample loop and Ion Pac separation column (AS-HC) coupled with pre-column. Recovery checks were carried out for the samples by spiking the sample and also using a variety of burn profiles.

Results

Table 1: Chloride assay analysis as determined by CIC

Catalyst	**Total chloride (mg kg^{-1})**
Non-Coastal Fresh	33
Non-Coastal Aged	<1
Coastal Fresh	91
Coastal Aged	<1

IC-ES/MS Analysis

Samples were digested by performing a lithium tetraborate fusion in a platinum crucible in a furnace at 1000ºC and then leaching the resulting melt in weak nitric acid. This leach solution was then diluted and analysed on an Agilent 7700 ICP-MS for the full suite of elements. Elements that could not be identified using the ICP-MS, due to interferences, were analysed using the Optima 3300RL ICP-OES. Li, B and Pt were analysed separately (due to their presence in the lithium tetraborate method) by digesting the sample by a sodium peroxide fusion in a nickel crucible.

The resulting melt was leached in hydrochloric acid. The solutions were analysed using an Optima 3300RL ICP-OES.

Table 2: Assay analysis as determined by IC-ES/MS

Analyte	**Non-Coastal Fresh,** %	**Non-Coastal Aged**, %	**Coastal Fresh**, %	**Coastal Aged**, %
Al *	21.4	23.9	15.5	15.8
Fe *	0.40	0.33	0.29	0.30
Mg *	5.13	4.97	6.73	6.78
Pt *	0.88	0.83	0.34	0.29
Si *	20.5	18.6	28.1	27.6
Ti *	0.28	0.30	0.29	0.31
	Non-Coastal Fresh, **ppm**	**Non-Coastal Aged**, **ppm**	**Coastal Fresh**, **ppm**	**Coastal Aged**, **ppm**
B	50	120	30	<20
Ba *	35	13	100	170
Bi	<10	<10	<10	12
Ca *	300	440	670	565
Ce	100	35	225	250
Cr *	110	95	45	50
Cu	<10	20	15	12
Ga *	30	30	25	25
K *	660	590	240	285
La	100	70	75	55
Li	13	<10	<20	<20
Mn	19	18	10	11
Mo	<10	<10	<10	10
Na *	570	570	700	695
Nb	11	<10	12	12
Nd *	14	10	75	30
Ni	75	45	35	20
Os	#	#	#	#
P *	110	980	105	335
Pd	4600	3600	<20	<20
Rh	17	<10	<20	<20
S *	430	2900	75	1170
Sr	<10	<10	40	30
V	65	60	70	75
Zn	16	55	50	55
Zr *	100	75	300	245

* Denotes ICP-ES data.
# not scanned

All other elements <10ppm have not been reported.