

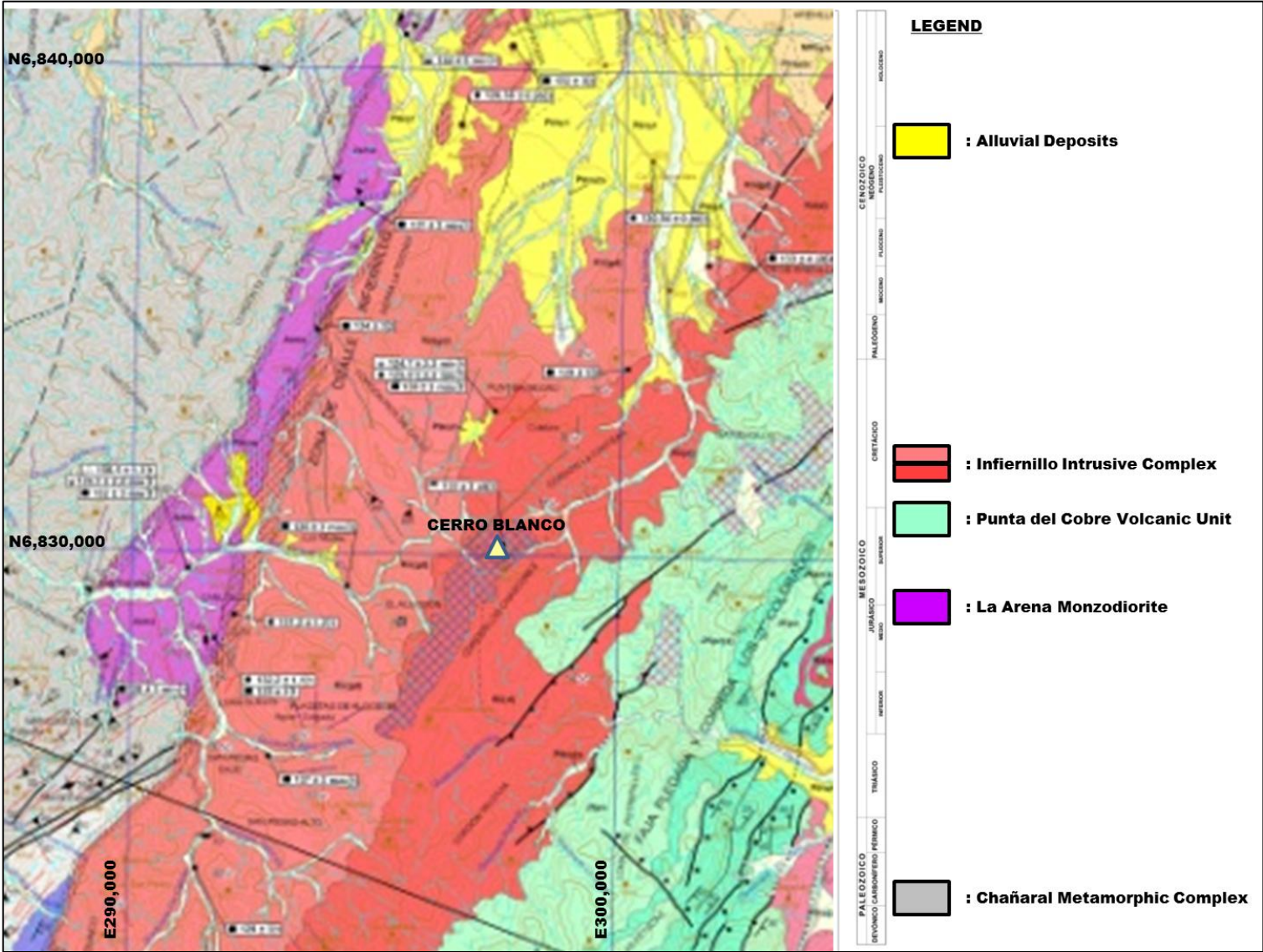
**PROYECTO TiO₂ CERRO BLANCO, CONTROL Y ASEGURAMIENTO DE CALIDAD,
UN CASO PARTICULAR**



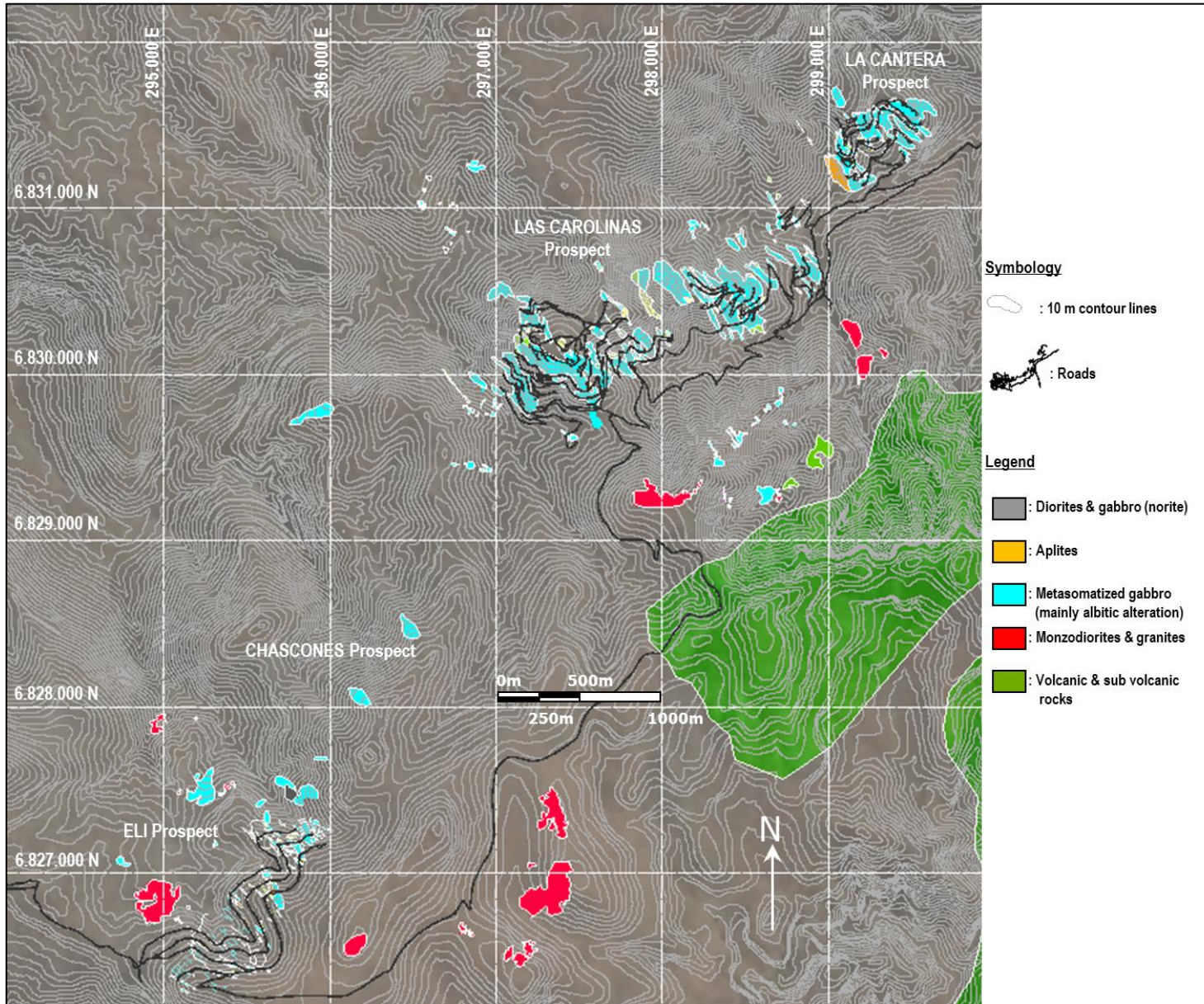
CERRO BLANCO / UBICACIÓN Y ACCESOS



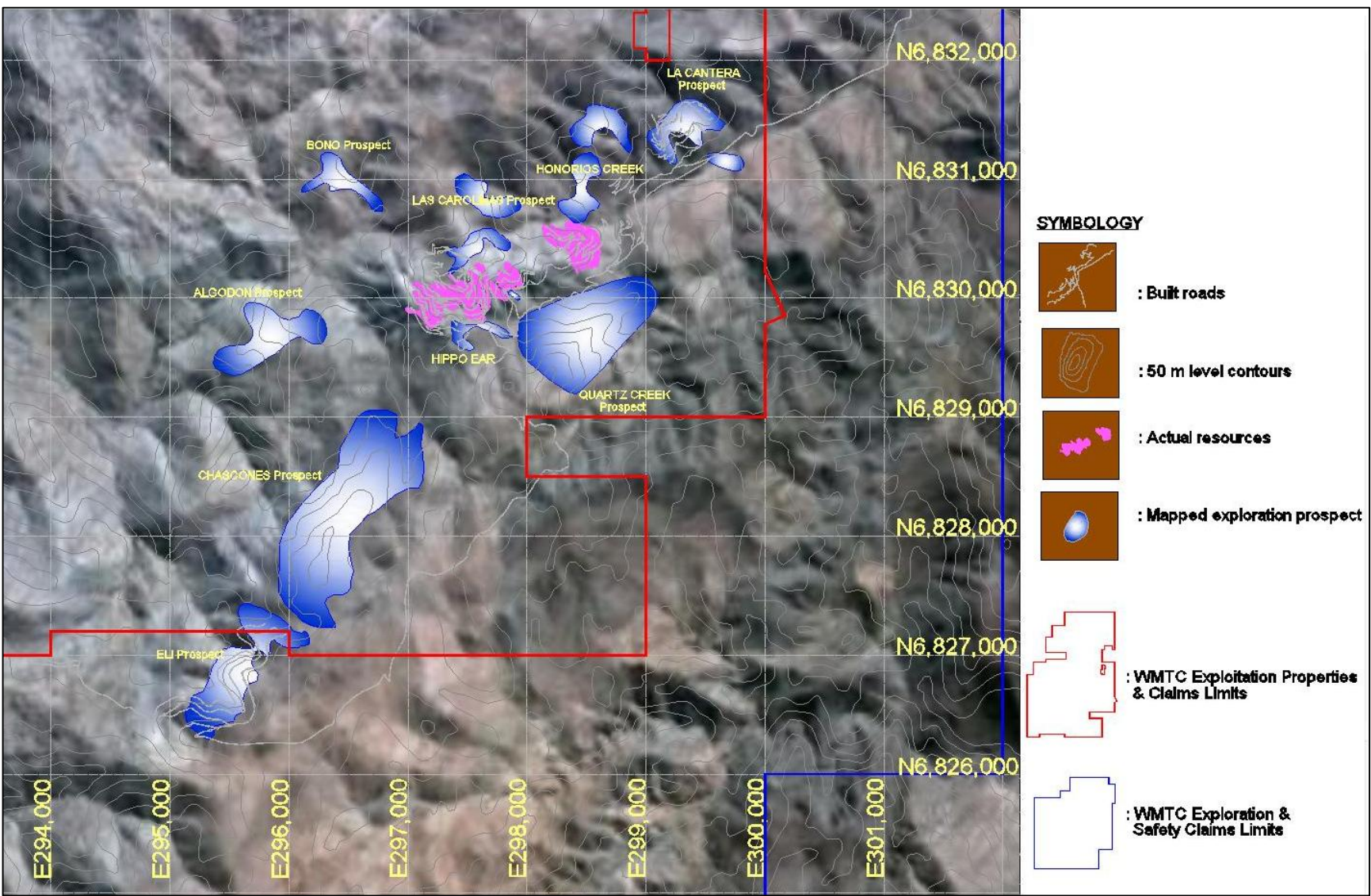
CERRO BLANCO / GEOLOGIA REGIONAL



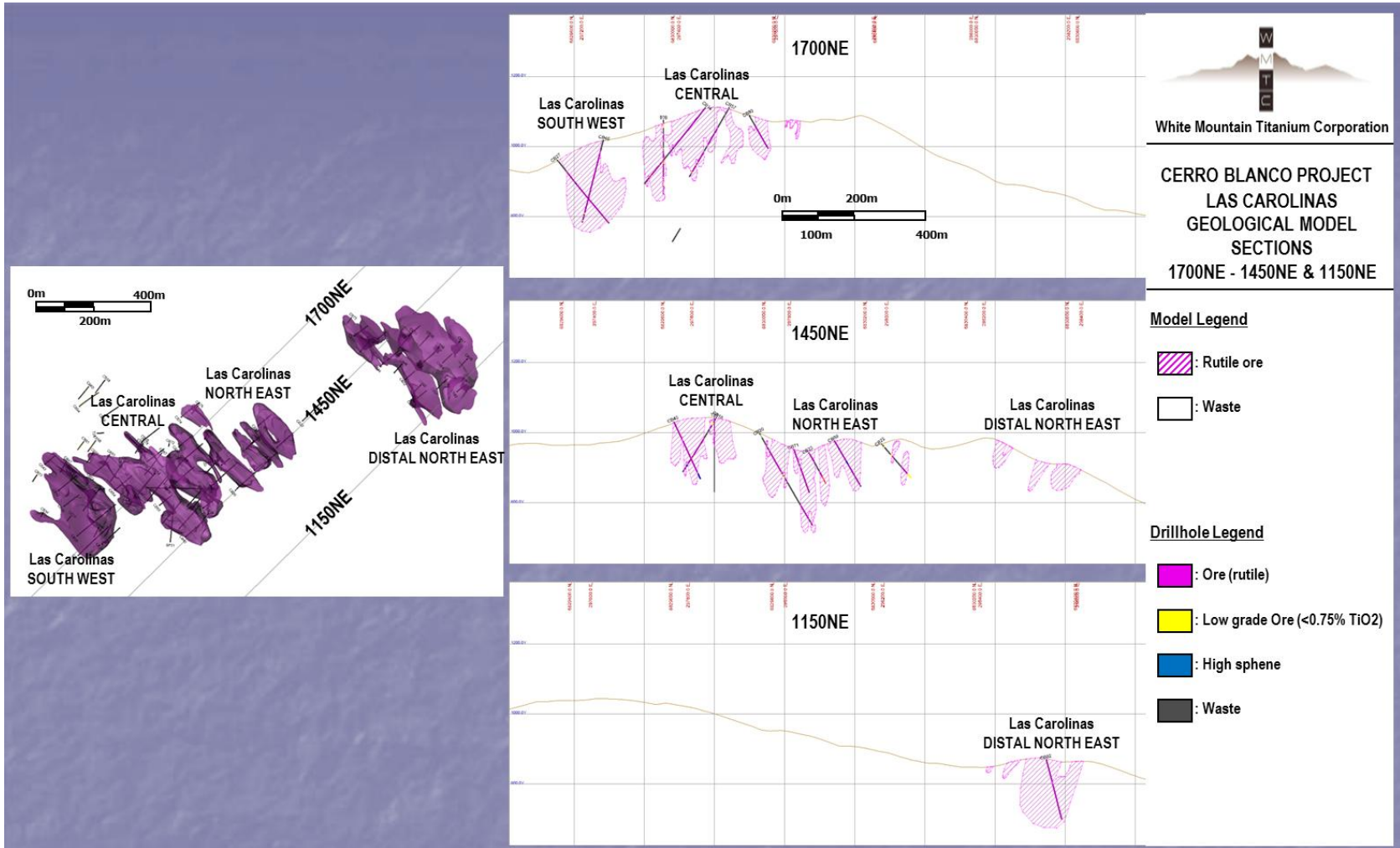
CERRO BLANCO / GEOLOGIA DISTRITAL



CERRO BLANCO / AREA RECURSOS Y PROSPECTOS EXPLORACION



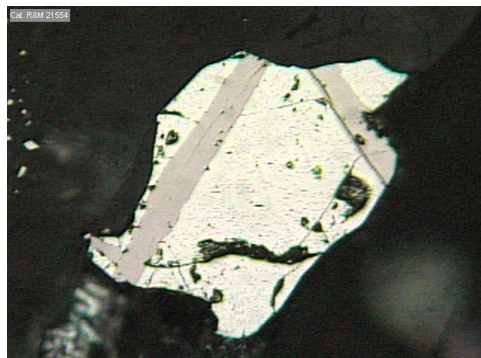
CERRO BLANCO / MODELO DE RECURSOS



CERRO BLANCO / ALTERACION - MINERALIZACION

Titanium-Bearing Mineralogical Species at Cerro Blanco

Mineral	Formula	D
		g/cc
Titanomagnetite	$(\text{Fe}^{2+}, \text{Fe}^{3+}, \text{Ti})_2\text{O}_4$	4.52
Ilmenite	$(\text{Fe}^{2+}, \text{Mg}, \text{Mn}, \text{Zn}, \text{Fe}^{3+})\text{TiO}_3$	4.78
Rutile	TiO_2	4.25
Anatase	TiO_2 --> Low temp polymorph or rutile	3.82 - 3.97
Titanite (Sphene)	$(\text{Ca}, \text{REE})(\text{Ti}, \text{Al}, \text{Fe})\text{SiO}_4(\text{O}, \text{OH}, \text{F})$	3.52







CERRO BLANCO / STANDARDS MATERIAL UTILIZADO

HOLE-ID	SAMPLE	TiO ₂
STANDARD - HIGH GRADE		
T3-008	10070-5	2.56
T2-023	10146-5	2.55
T2-023	10144-5	2.53
Mean Grade		2.55
STANDARD - MEDIUM GRADE		
T7-009	10453-5	2.06
T8-014	10505-5	2.09
Mean Grade		2.08
STANDARD - LOW GRADE		
T5-010	10329-5	1.50
T2-023	10155-5	1.53
T7-009	10435-5	1.53
Mean Grade		1.52







CERRO BLANCO / STANDARDS PROTOCOLO PREPARACION

EQUIPOS/OTROS	ETAPAS	DESCRIPCIÓN
<ul style="list-style-type: none"> Balanzas electrónica Computador Impresoras 	<p style="text-align: center;">RECEPCIÓN</p>  <p style="text-align: center;">↓</p>	<ul style="list-style-type: none"> Generación de Lotes. Generación de C.de Barras. Registro de Pesos. Registro de Observaciones.
<ul style="list-style-type: none"> Horno de secado con circulación de aire forzado y control de temperatura. 	<p style="text-align: center;">SECADO</p>  <p style="text-align: center;">↓</p>	<ul style="list-style-type: none"> Secado de la Totalidad de la muestra 105° C 8-12 hrs.
<ul style="list-style-type: none"> Chancador de mandíbula ajustado a 2 mm. 	<p style="text-align: center;">CHANCADO</p>  <p style="text-align: center;">↓</p>	<ul style="list-style-type: none"> Chancado de la totalidad de la muestra hasta obtener un producto del 100 % bajo 10 # Ty.
<ul style="list-style-type: none"> Pulverizador LM-2 con control de tiempo. 	<p style="text-align: center;">PULVERIZADO</p>  <p style="text-align: center;">↓</p>	<ul style="list-style-type: none"> Pulverizado de la totalidad de la muestras a 150 # Ty.

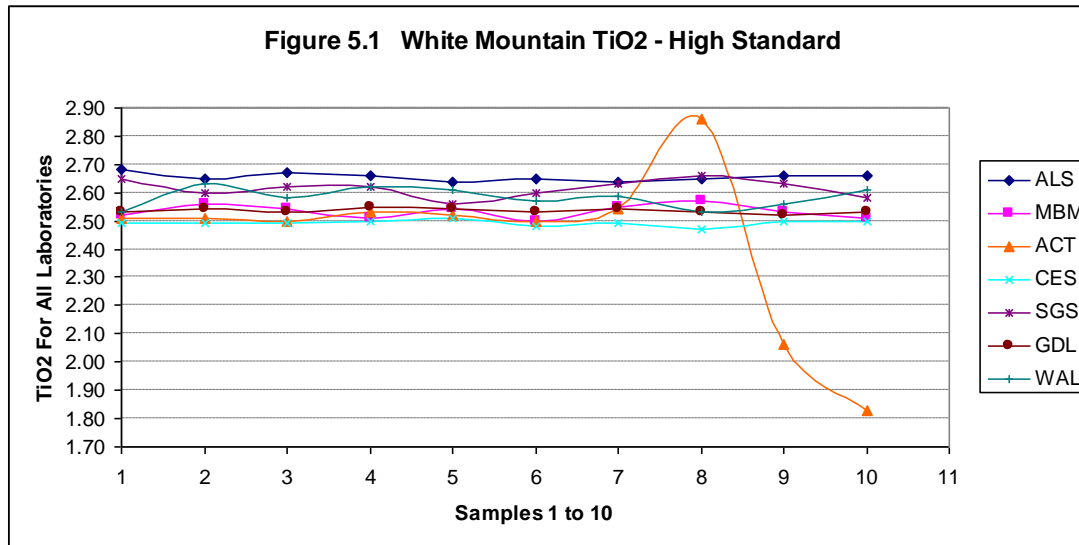


CERRO BLANCO / STANDARDS PROTOCOLO PREPARACION

<ul style="list-style-type: none"> • Hamero cribado a 150 # Ty. 	<p style="text-align: center;">TAMIZADO</p>  <p style="text-align: center;">↓</p>	<ul style="list-style-type: none"> • Tamizado de la totalidad de la muestra a 150 #Ty. • La fracción gruesa debe volver a pulverizado • Se debe obtener un producto final del 100% bajo 150#Ty.
<ul style="list-style-type: none"> • Roleador de Pantalón. 	<p style="text-align: center;">HOMOGENIZADO</p>  <p style="text-align: center;">↓</p>	<ul style="list-style-type: none"> • Homogeneizado de la muestras por 24 horas.
<ul style="list-style-type: none"> • Divisor rotatorio. • Frascos. • Etiquetas. 	<p style="text-align: center;">DIV. Y ENVASADO</p>  	<ul style="list-style-type: none"> • División de las submuestra en divisor rotatorio por incrementos (70-100) hasta obtener 250g. • Envasado de la muestras y rotulado en sobres de capacidad de 250g.

CERRO BLANCO / ROUND ROBIN

	LABORATORIES	METHOD	CODE
1	ALS Chemex – Vancouver	Lithium Borate Flux	ALS
2	Actlabs	Lithium Meta/Tetraborate Fusion	ACT
3	Nevada Bureau of Mines & Geology		NBM
4	Wyoming Analytical Laboratories		WAL
5	Global Discovery Labs – Teck Cominco	Lithium Tetraborate Flux	GDL
6	SGS Lakefield Research Limited	Borate Fusion	SGS
7	CESMEC – Chile		CES



CERRO BLANCO / ROUND ROBIN

Figure 5.2 White Mountain TiO2 - Medium Standard

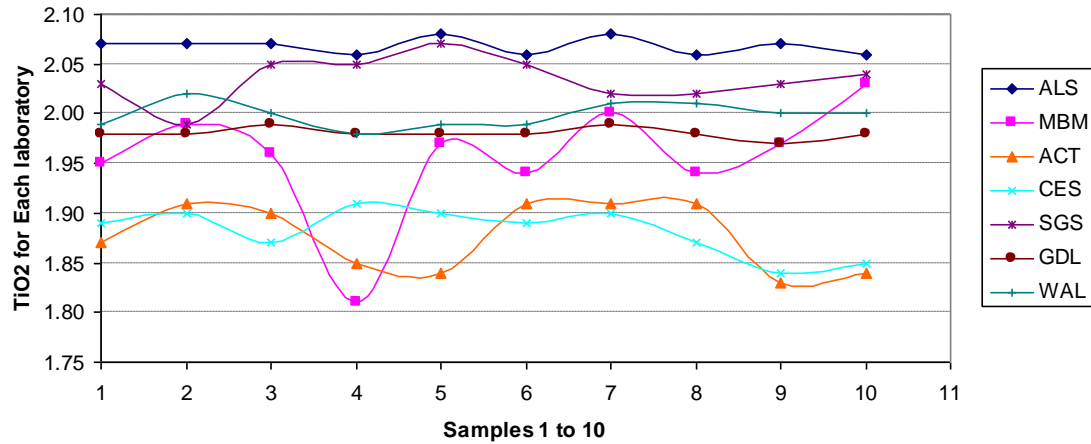
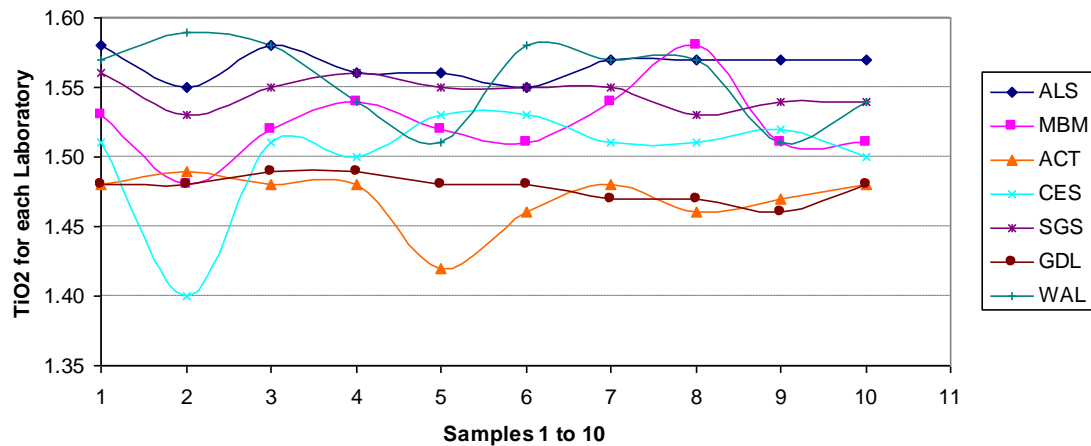


Figure 5.3 White Mountain TiO2 - Low Standard



CERRO BLANCO / ROUND ROBIN

Medias Laboratorios Para Cada Standard

Laboratory	HIGH	MEDIUM	LOW
ALS	2.656	2.068	1.566
NBM	2.533	1.956	1.524
ACT	2.436	1.877	1.470
CES	2.492	1.882	1.502
SGS	2.615	2.035	1.546
GDL	2.534	1.981	1.478
WAL	2.583	1.999	1.556

Rangos Laboratorios Para Cada Standard

Laboratory	HIGH	MEDIUM	LOW
ALS	0.040	0.020	0.030
NBM	0.070	0.220	0.100
ACT	1.030	0.080	0.070
CES	0.040	0.070	0.130
SGS	0.100	0.080	0.030
GDL	0.030	0.020	0.030
WAL	0.100	0.040	0.080

Varianzas Laboratorios Para Cada Standard

Laboratory	HIGH	MEDIUM	LOW
ALS	0.00016	0.00006	0.00012
NBM	0.00053	0.00343	0.00069
ACT	0.08158	0.00118	0.00040
CES	0.00013	0.00055	0.00140
SGS	0.00094	0.00049	0.00012
GDL	0.00007	0.00003	0.00008
WAL	0.00127	0.00014	0.00085



CERRO BLANCO / ROUND ROBIN

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Test Cochran de Precisión

$$C_j = \frac{S_j^2}{\sum_{i=1}^N S_i^2}$$

where:

C_j = Cochran's C statistic for data series j

S_j = standard deviation of data series j

N = number of data series that remain in the data set; N is decreased in steps of 1 upon each iteration of the C test

S_i = standard deviation of data series i ($1 \leq i \leq N$)

$$C_{UL}(\alpha, n, N) = \left[1 + \frac{N-1}{F_c(\alpha/N, (n-1), (N-1)(n-1))} \right]^{-1}$$

Here:

C_{UL} = upper limit critical value for one-sided test on a balanced design

α = significance level

n = number of data points per data series

F_c = critical value of Fisher's F ratio; F_c can be obtained from tables of the F distribution^[10] or using computer software for this function.

Level	HIGH	MEDIUM	LOW
C	0.963	0.582	0.382
	ACT	NBM	CES
Critical C 1%	0.375	0.375	0.375
Critical C 5%	0.326	0.326	0.326

Test Grubb de Exactitud

$$G = \frac{\bar{Y} - Y_{\min}}{s}$$

with Y_{\min} denoting the minimum value. To test whether the maximum value is an outlier, the test statistic is

$$G = \frac{Y_{\max} - \bar{Y}}{s}$$

with Y_{\max} denoting the maximum value.

For the **two-sided test**, the hypothesis of no outliers is rejected at **significance level α** if

$$G > \frac{N-1}{\sqrt{N}} \sqrt{\frac{t_{\alpha/(2N), N-2}^2}{N-2 + t_{\alpha/(2N), N-2}^2}}$$

with $t_{\alpha/(2N), N-2}$ denoting the upper critical value of the t-distribution with $N-2$ degrees of freedom and a significance level of $\alpha/(2N)$. For the one-sided tests, replace $\alpha/(2N)$ with α/N .

Test	HIGH	MEDIUM	LOW
Single Lo	1.52	1.30	1.32
Single Hi	1.42	1.34	1.20
Critical 1%	2.14	2.14	2.14
Critical 5%	2.02	2.02	2.02



CERRO BLANCO / LEYES NOMINALES Y LIMITES CONFIDENCIA

Nominal Grades & Limits	HIGH	MEDIUM	LOW
Standard Nominal Grades	2.57	1.97	1.52
Within Lab 95% Upper Limit	2.61	2.01	1.56
Within Lab 95% Lower Limit	2.53	1.93	1.48
Global 95% Upper Limit	2.73	2.17	1.64
Global 95% Lower Limit	2.41	1.77	1.40



CERRO BLANCO / STANDARDS PERFORMANCE CAMPAÑAS DDH 2006 & 2008

Figure 6.1 White Mountain TiO₂ - High Standard

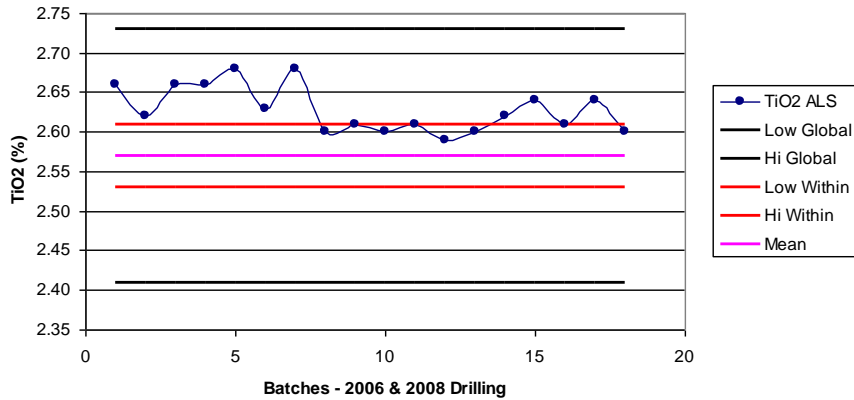


Figure 6.2 White Mountain TiO₂ - Medium Standard

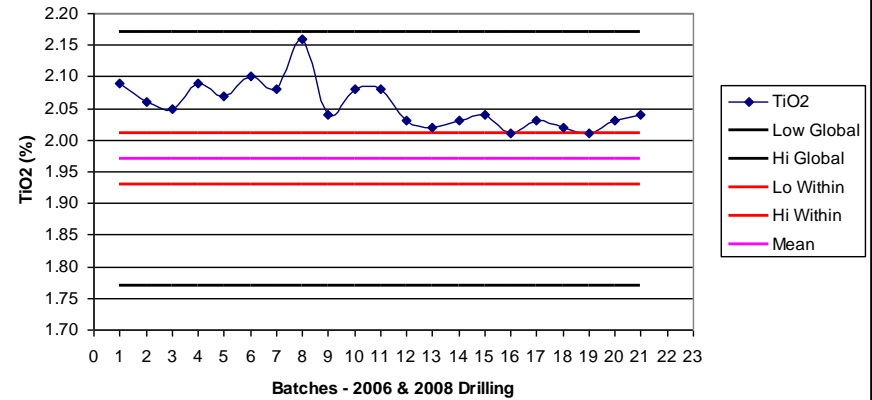
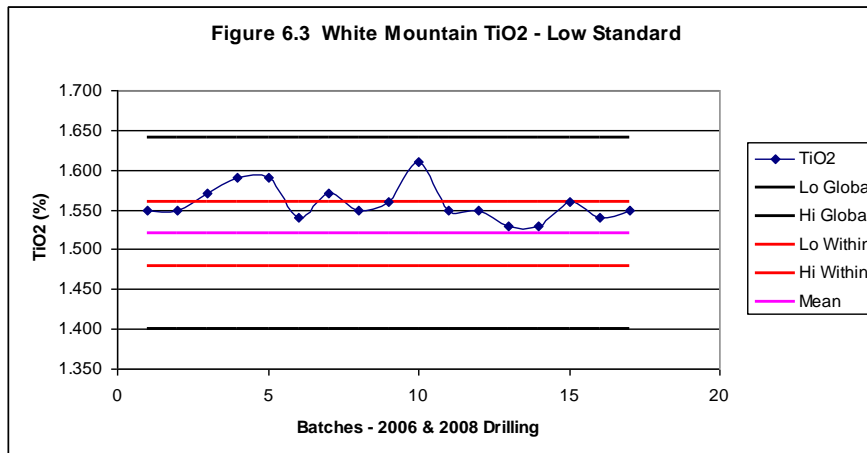
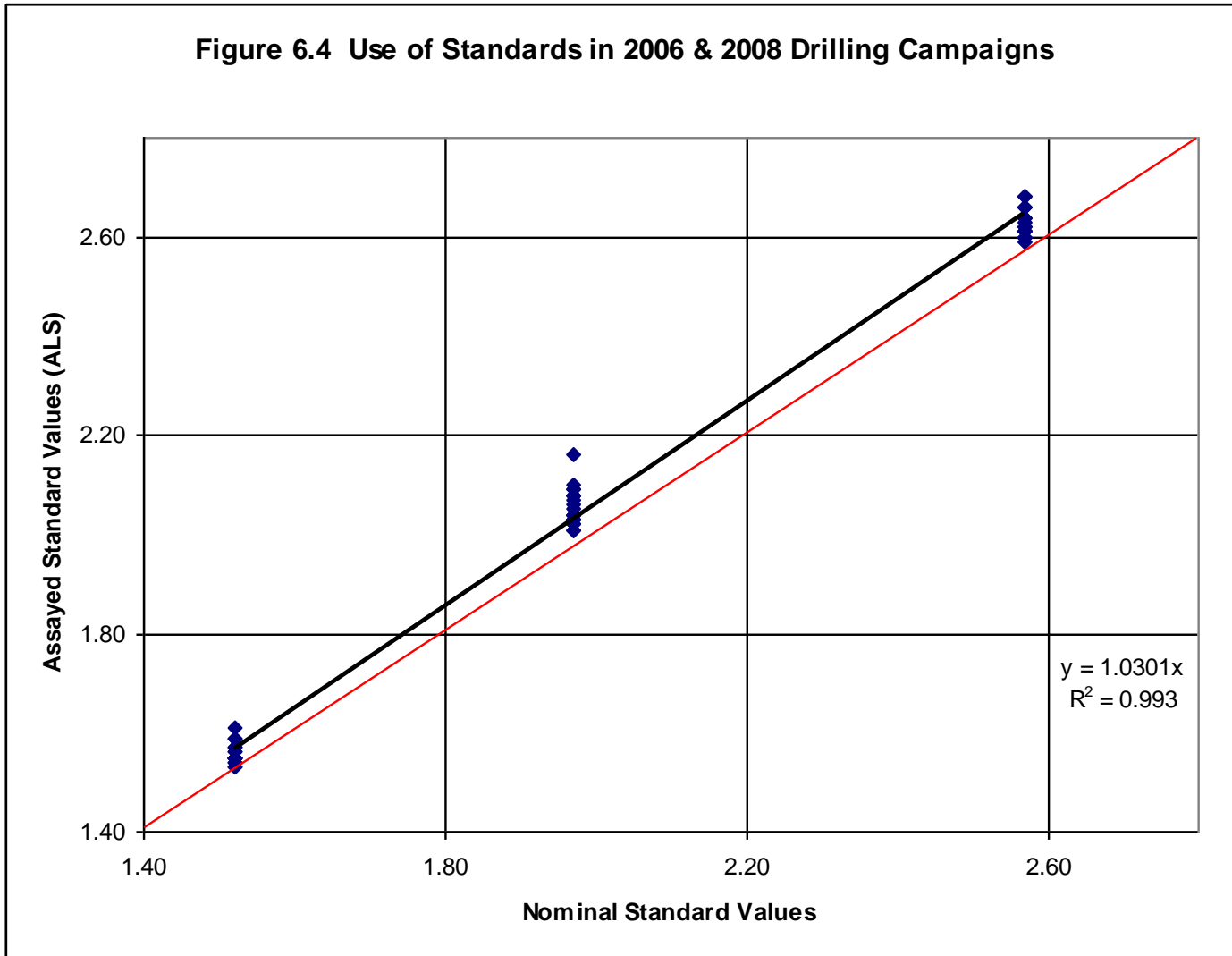


Figure 6.3 White Mountain TiO₂ - Low Standard





CERRO BLANCO / STANDARDS PERFORMANCE CAMPAÑA DDH 2010-2011

Figure 2.1 White Mountain TiO2 - High Standard

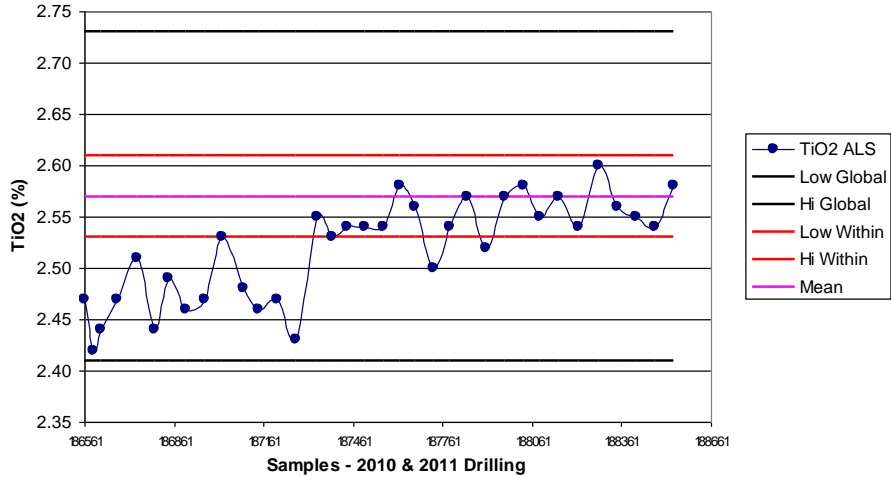


Figure 2.2 White Mountain TiO2 - Medium Standard

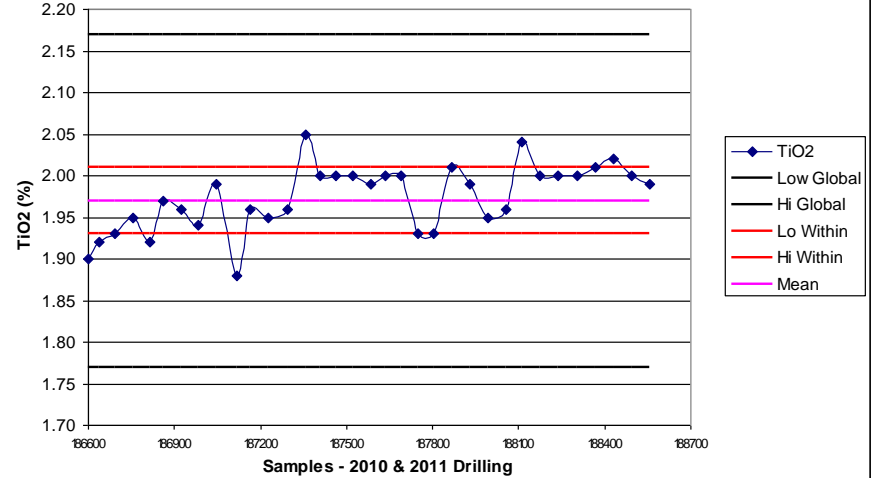
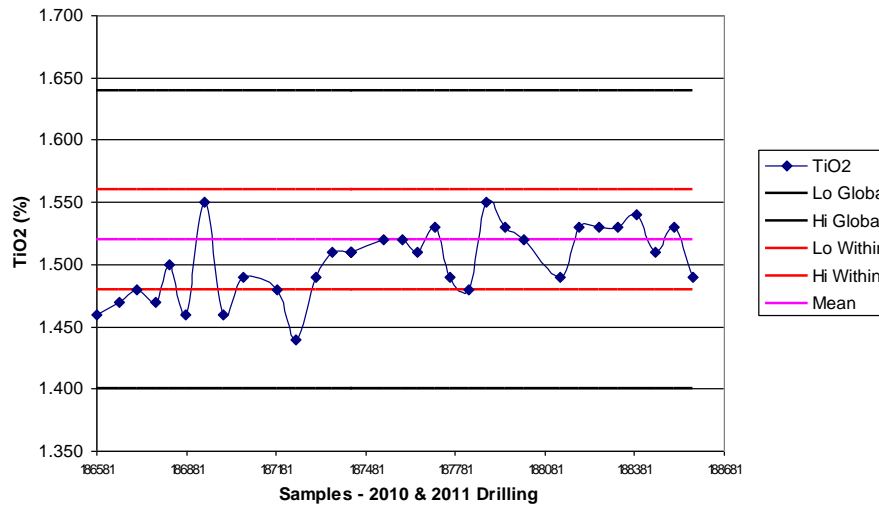
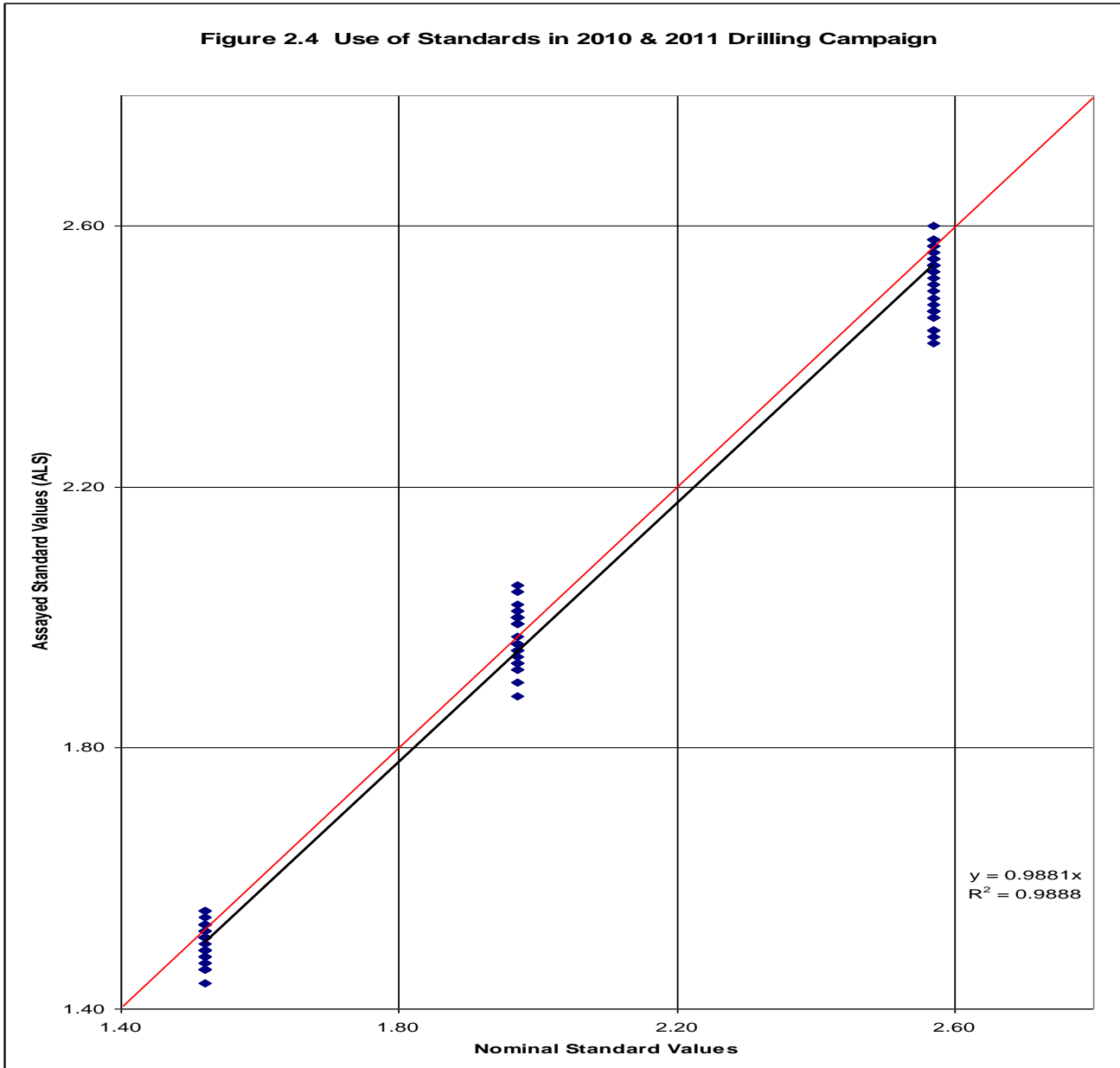


Figure 2.3 White Mountain TiO2 - Low Standard



CERRO BLANCO / STANDARDS PERFORMANCE CAMPAÑA DDH 2010-2011

Figure 2.4 Use of Standards in 2010 & 2011 Drilling Campaign



GRACIAS

