

Metallurgical Balance System for Codelco Teniente

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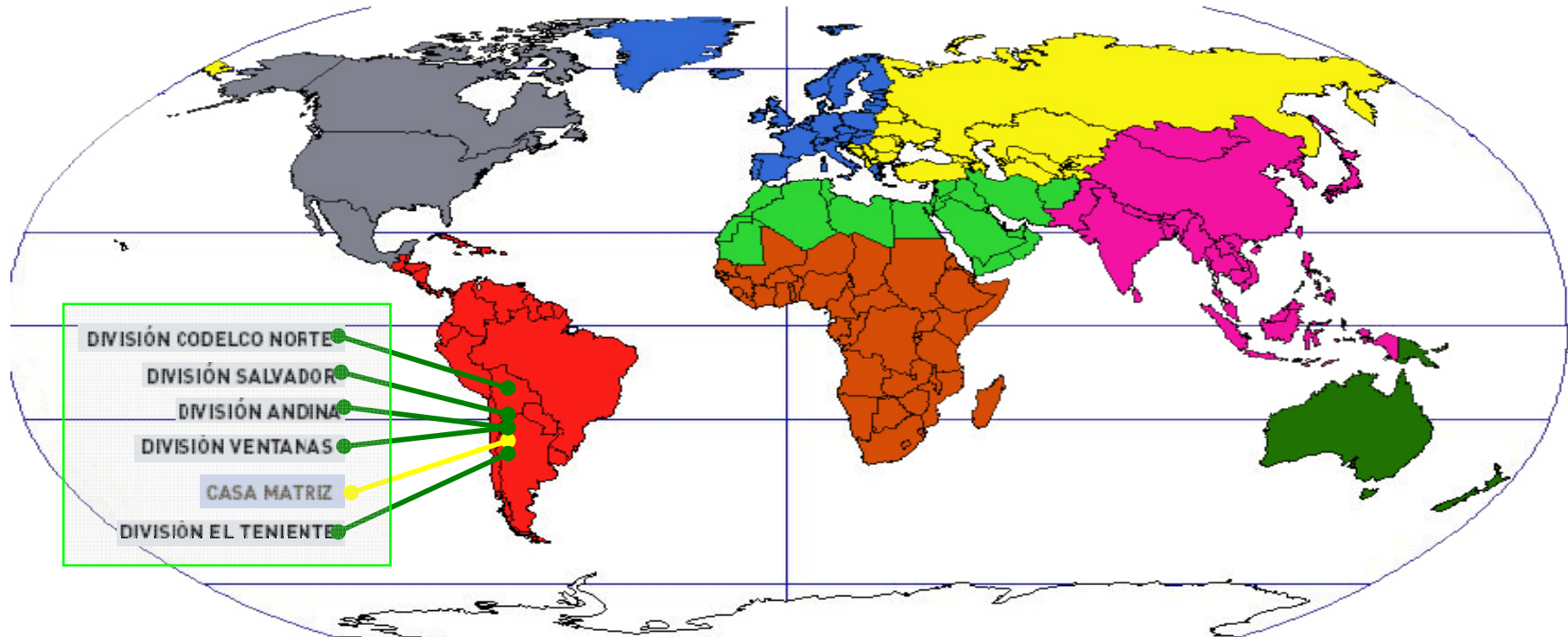




Vicepresidencia Corporativa de Servicios Compartidos



Codelco, Chile



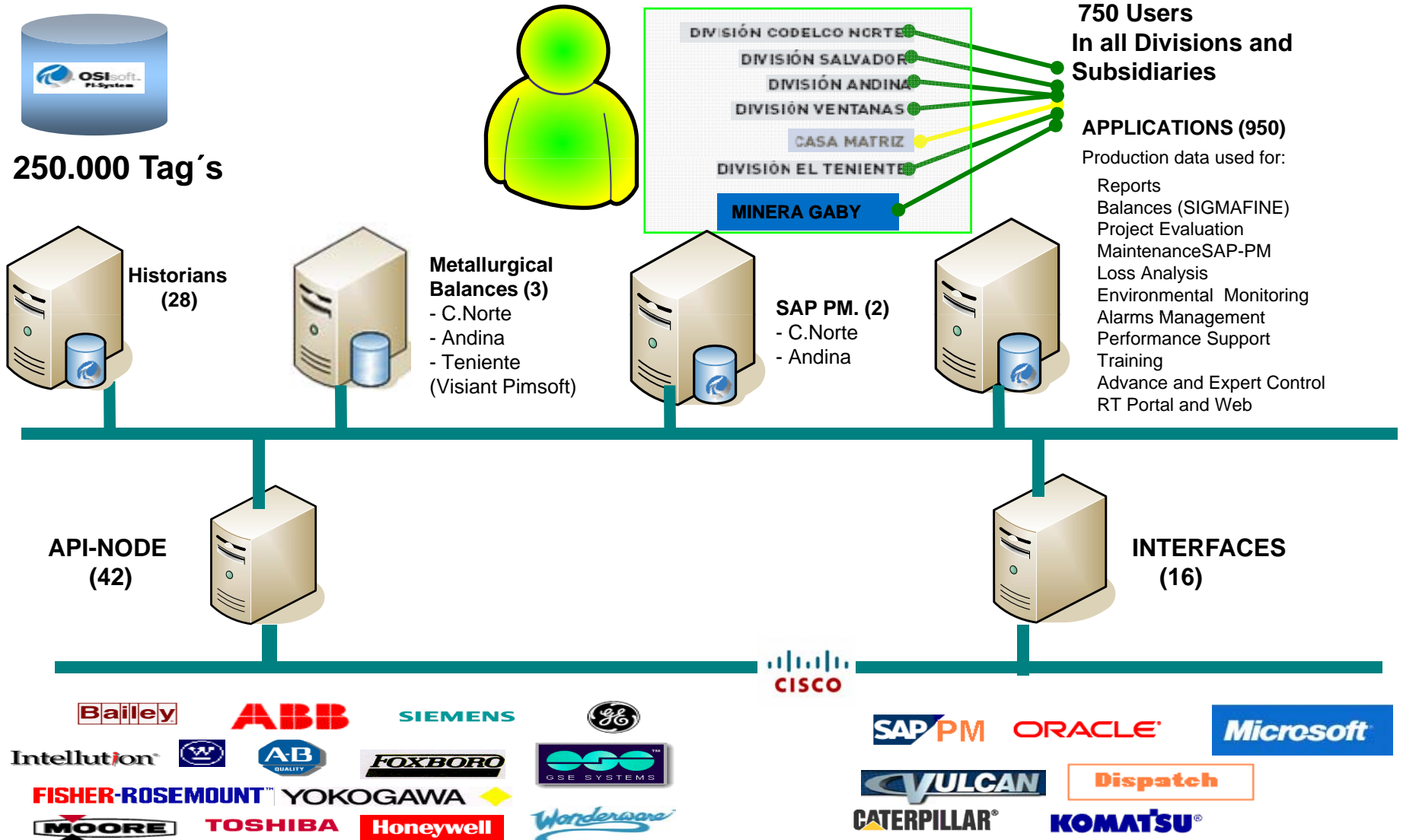
THE CODELCO TENIENTE MINING DEPOSIT IS LOCATED IN CHILE'S SIXTH REGION, 40 KM. OF RANCAGUA CITY, AT 2.900 msnm OF MEDIUM ALTITUDE

ITS MAIN PRODUCTION LINES ARE BASED IN :

SULFUR LINE

- Copper Concentrate.
- Molybdenum Concentrate

Architecture and Localization of the PI System as of October 2009



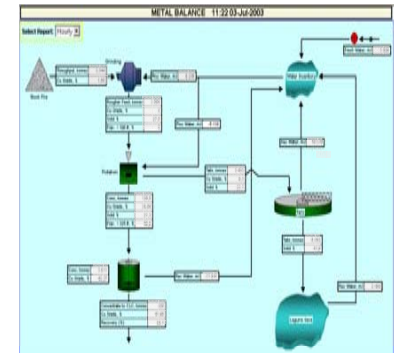
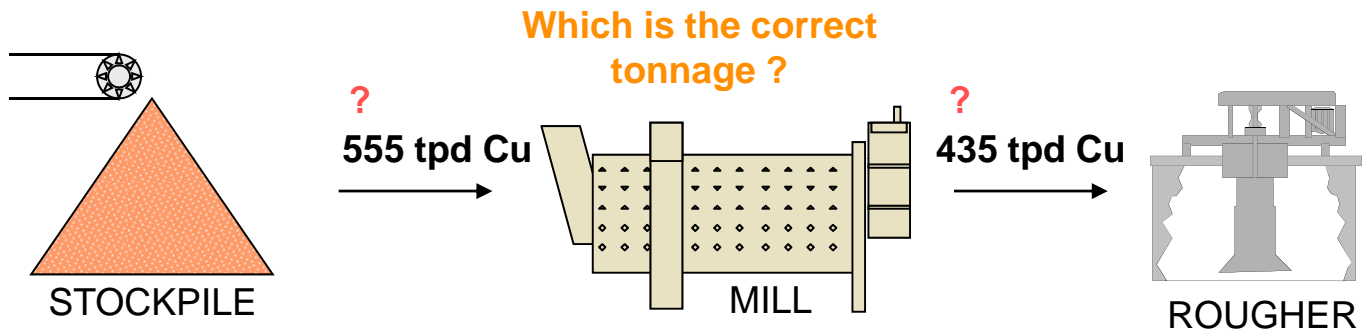


Vicepresidencia Corporativa de Servicios Compartidos

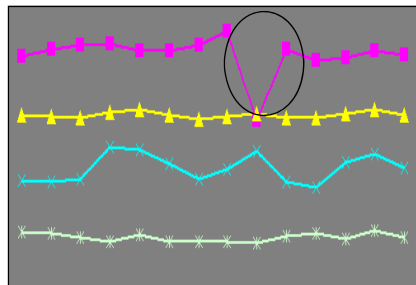
Metallurgical Balance System for Codelco Teniente

Production Balance and Data Reconciliation

Application to create Metallurgical Production Balances to be used in Metallurgical Accounting and in which the data used in the balance is analyzed against historical reconciled values



**More Data ==>
Statistical Reconciliation**



Additional (redundant) data	
0.95 % Cu	0.75 % Cu
5.8 tpd Mo	5.8 tpd Mo
0.01 % Mo	0.01 % Mo
58,000 tpd	58,000 tpd

Input Units (BBL)					Case: Demo
Open	Inventory	Close	Inputs	Outputs	Imbalance
Raw Balance	8092556.26	4010146.40	548854.16	133647.46	8616.57
Reconciled Balance	3803556.26	4022079.06	548854.16	133647.46	3316.10
Adjustment	0.00	11932.66	0.00	0.00	

Balance Units (MLBS)					Accounting Period
Open	Inventory	Close	Inputs	Outputs	Imbalance
Raw Balance	1065767.15	1191263.32	164527.94	35783.48	3248.29
Reconciled Balance	1065767.15	1194511.61	164527.94	35783.48	0.00
Adjustment	0.00	3248.29	0.00	0.00	

What is a Metallurgical Balance and what is its purpose ?



The Metallurgical Balance is a management tool used by financial accounting, mining, metallurgical and operational department personnel. This balance allows determination in consolidated form of:

- ✓ **Official production numbers.**
- ✓ **Quantity, availability and value of material in inventories.**
- ✓ **Production and environmental strategies.**
- ✓ **Management analysis.**

Can a Metallurgical Balance increase profit?

Yes , by making successive corrections to the problem areas by reduction in losses, improvement in efficiency, and real quantification of material in stock.

All this is translated into “ effective metallurgical and operational management”

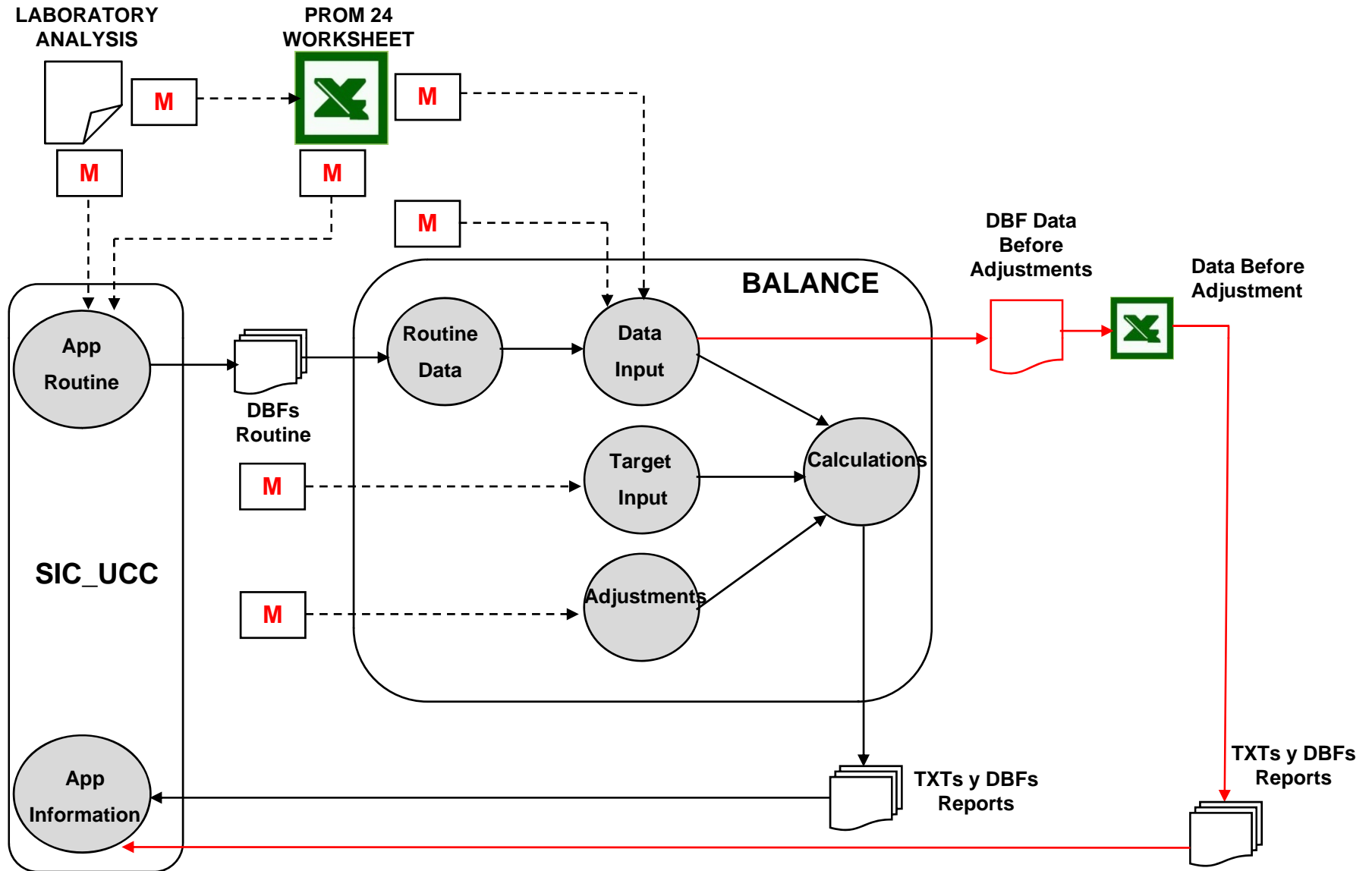
What do we hope to have in a Balance System?



A System...

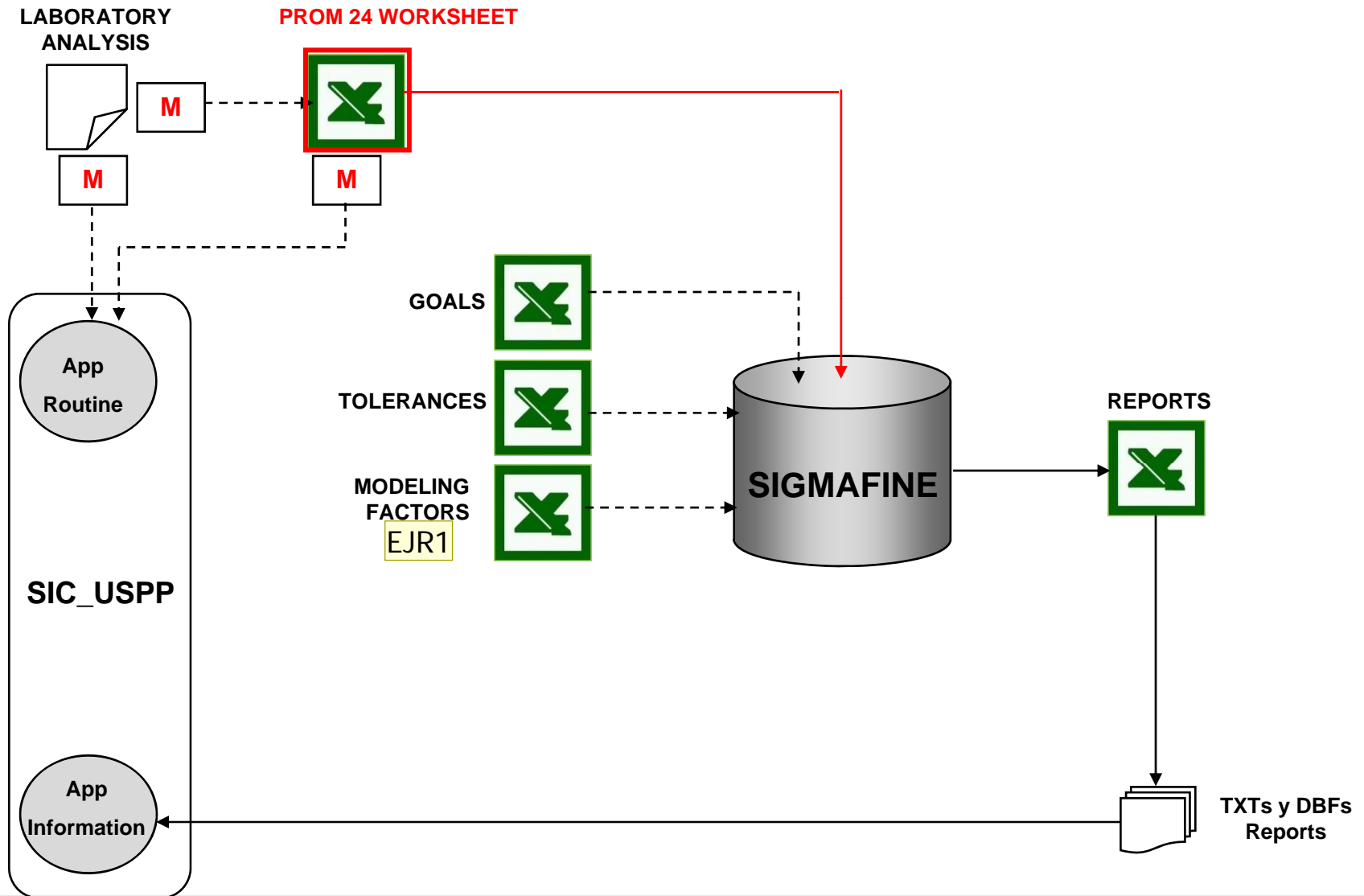
- **THAT IS AUDITABLE**
- **THAT ALWAYS USES THE SAME CONCEPTS**
- **THAT IS BASED ONLY ON INFORMATION**
- **THAT CAN NOT BE MANIPULATED**
- **THAT ITS PROCEDURES ARE ALIGNED WITH METALLURGICAL PRACTICES**

Previous Architecture



What Was Implemented

IMPLEMENTED STRUCTURE AND INFORMATION FLOW



Slide 10

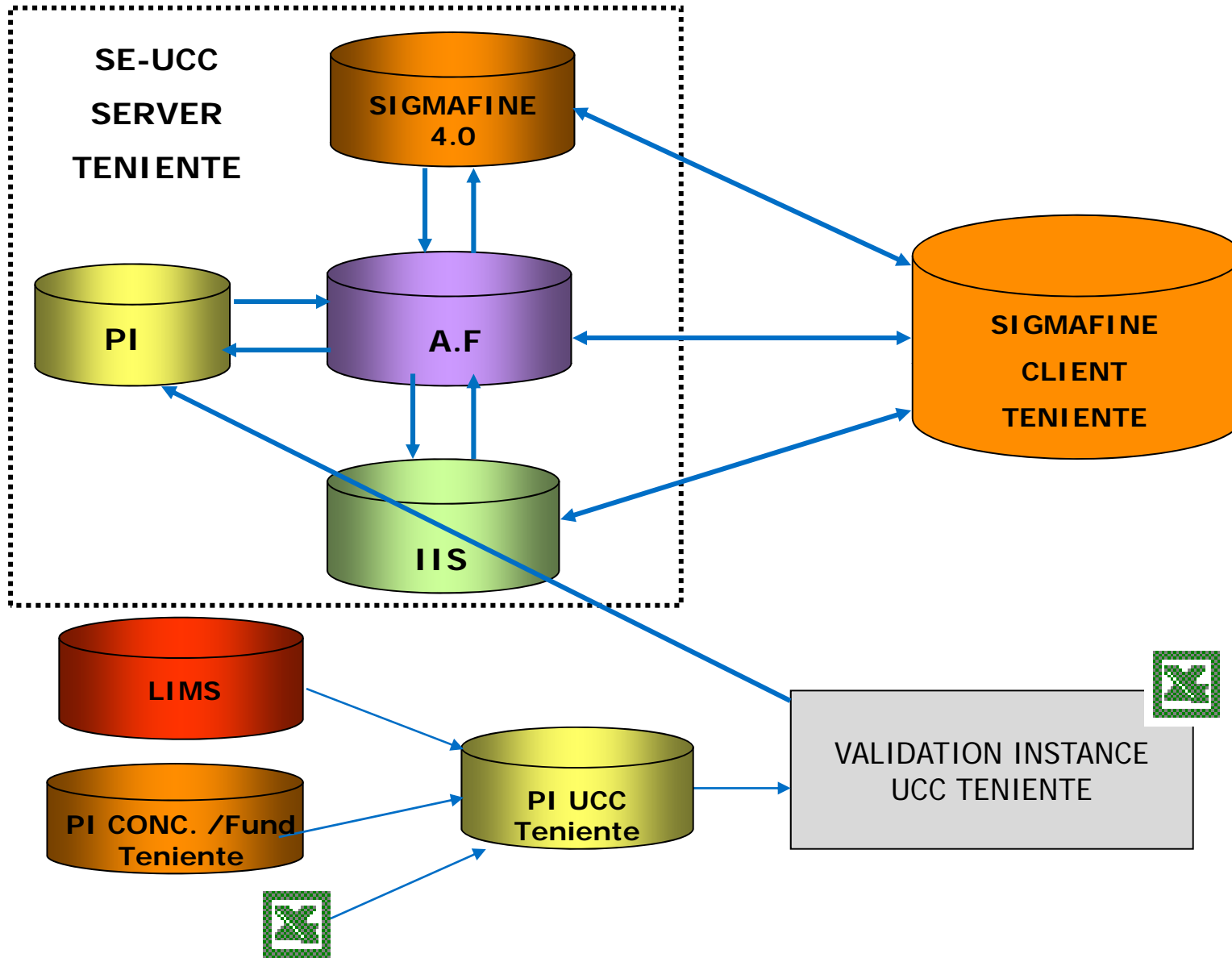
EJR1

Original in spanish "Factores Moldeo"

Assumed it was a typo and the correct version is "Factores Modelo", which translate to "Modeling Factor"

Ereguera, 4/12/2010

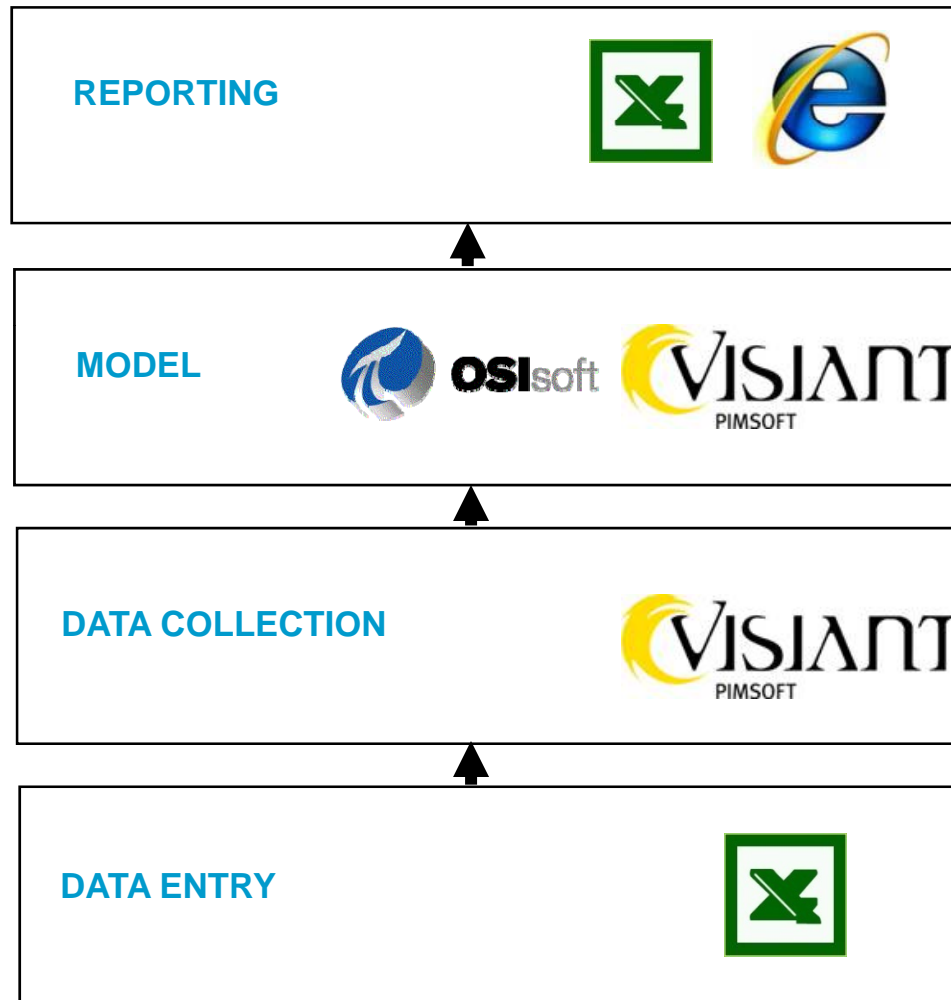
Teniente Balance



Project Abstract



STANDARD PLATFORM



Project Summary



SIMILAR OPERATION TO ACTUAL SYSTEM



Project Summary



SAME ACTUAL REPORTS



The screenshot shows a Windows desktop with a blue background. A window titled 'F:\Apps\CC\BALANCE.EXE' is open, displaying a financial report for December 2008. The report is titled 'BALANCE DIARIO 11-DICIEMBRE-2008' and includes a menu bar with 'Ingreso', 'Cálculos', 'Destino', 'Meses', 'Opciones', 'Útiles', 'Ambientes', and 'DICIEMBRE'. The main content is a table with columns for various financial categories and their values.

Category	ts	ts	ts	ts	ts	ts	ts	ts
ST. P. SAG ANTES	ts	-----	-----	-----	25345	55968	81313	81313
HOY	ts	-----	-----	-----	25345	55968	81313	81313
B. GR+INT ANTES	ts	6855	14123	-----	-----	-----	20978	21160
HOY	ts	7250	13910	-----	-----	-----	21160	21160
B. FINOS ANTES	ts	4130	30995	14569	-----	-----	49694	50464
HOY	ts	4900	30995	14569	-----	-----	50464	50464
MOLIDO	ts	14928	44362	18861	18623	40199	136973	136973
zc	0,948	0,892	0,853	1,035	1,021	0,950	0,950	0,950
tf	141,5	395,7	160,9	192,7	410,4	1301,3	1301,3	1301,3
SEWELL	ts	14928	63223	58822	-----	-----	136973	136973
COLON	zc	0,948	0,880	1,025	-----	-----	0,950	0,950
SAG	tf	141,5	556,6	663,2	-----	-----	1301,3	1301,3
RETRAT.	ts	-----	-----	-----	-----	-----	-----	-----
P. T. R.	ts	-----	-----	-----	-----	-----	-----	-----
GENERAL	ts	-----	-----	-----	-----	-----	-----	-----
PERDIDA MOLIDO	ts	0	0	-----	-----	-----	0	0

The screenshot shows a Microsoft Excel spreadsheet titled 'ReportesBalance.xls'. The spreadsheet displays a financial report for 'SUPERINTENDENCIA SERVICIOS A LA PRODUCCION' as of 31-03-2009. The report includes a menu bar with 'ARCHIVAR' and 'VER CALENDARIO'. The main content is a table with columns for various financial categories and their values. A 'Calendario' dialog box is open, showing the date '31-03-2009' and buttons for 'Aceptar' and 'Salir'.

Category	ts	ts	ts	ts	ts	ts	ts	ts
MIN. ACARRREADO	ts	221306	690164	1405205	2316675	-----	-----	-----
MIN. RETORNADO	ts	0	0	-----	-----	-----	-----	-----
ST. P. SAG ANTES	ts	-----	-----	845	-----	-----	-----	-----
HOY	ts	-----	-----	355	-----	-----	-----	-----
B. GR+INT ANTES	ts	0404	12640	-----	-----	-----	-----	-----
HOY	ts	9020	12200	-----	-----	-----	21220	21220
B. FINOS ANTES	ts	10900	38081	14274	-----	-----	63255	63255
HOY	ts	5900	14233	14233	-----	-----	34266	34266
MOLIDO	ts	202885	802230	314396	282091	712136	2313738	2313738
zc	0,914	0,907	0,887	1,021	0,974	0,940	0,940	0,940
tf	1854,9	7279,2	2789,3	2880,8	6936,1	21740,8	21740,8	21740,8
SEWELL	ts	-----	-----	-----	-----	-----	-----	-----
COLON	ts	-----	-----	-----	-----	-----	-----	-----
SAG	ts	-----	-----	-----	-----	-----	-----	-----
RETRAT.	ts	-----	-----	-----	-----	-----	-----	-----
RELAVE	ts	-----	-----	-----	-----	-----	-----	-----
GENERAL	ts	-----	-----	-----	-----	-----	-----	-----

COMPATABILITY WITH OTHER SYSTEMS IN THE DIVISION

Informes Unidad Control de Calidad

Archivo Ayuda

Informes, Unidad Control de Calidad

Informes

- Informe Diario Conc. Sewell
- Informe Diario Conc. Colón
- Informe Diario Pta. SX
- Informe Diario P.T.P.F.
- Informe Diario Fundición
- Balance Diario Plantas**
- Balance Acumulado
- Balance Acumulado Ajustado
- Informe Gerencia Plantas
- Informe Gerencia FU
- Balance Mensual Oficial

30-03-2009 Hoy Ayer

Imprimir Exportar

Balance Diario Mina Concentrador 30 de Marzo de 2009

CODELCO CHILE, DIVISION EL TENIENTE
 SUPERINTENDENCIA SERVICIOS A LA PRODUCCION
 UNIDAD CONTROL DE CALIDAD

EMITIDO
 31-MAR-2009
 09:50:24

INFORME DE PRODUCCION DIARIA AJUSTADA 30-MARZO-2009

T O T A L E S

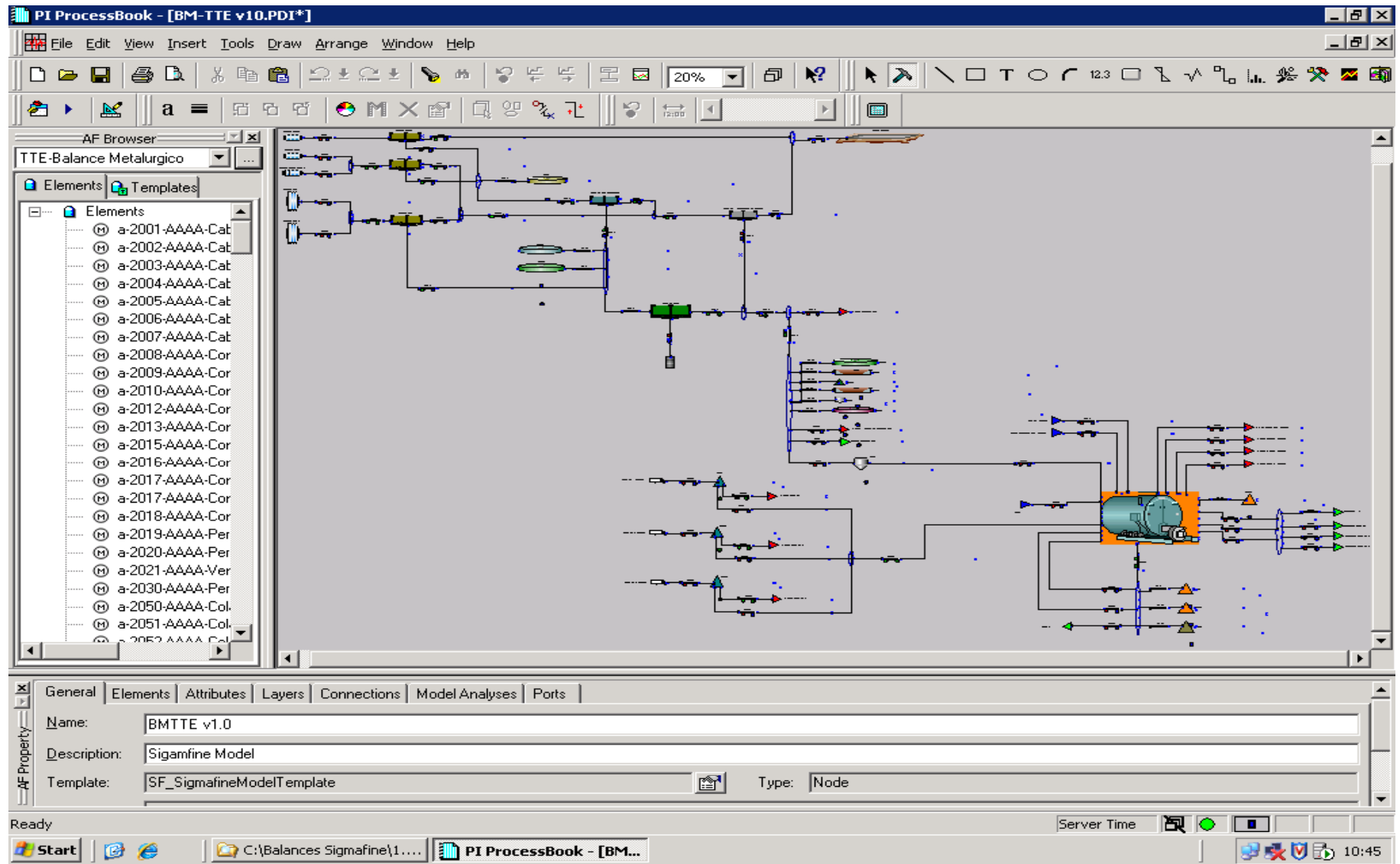
		SEWELL	CH. SEC	CH. PRIM	HOY ACUM. AJ.		
MIN. ACARREADO	TMS	13312	0	0	13312	3783770	
		C116 C212A+C115 C114	C315	C316			
CHANCADO	TMS	9851	SinInf	SinInf	SinInf	SinInf	
		SEWELL	M.1-12	M.UNIT	M.SAG1	M.SAG2	HOY ACUM. AJ.
TMS	9795	0	0	0	0	9795 3866150	
MOLIDO	%Cu	0,886	0,000	0,000	0,000	0,000	0,886 0,931
	TMF	86,8	0,0	0,0	0,0	0,0	86,8 35986,6
		SEWELL	COLON	SAG	RETRAT	P.T.R.	HOY ACUM. AJ.
ALIMENTACION	TMS	9795	0	0	334	165	
FLOTACION	%Cu	0,89	0,00	0,000	16,35	2,80	

Windows Taskbar: Start, C:\Balances Sigmafi..., AFExplorer, ReportesBalance.xls, Datos Antes Ajuste.xls, Informes Unidad Co..., 13:38

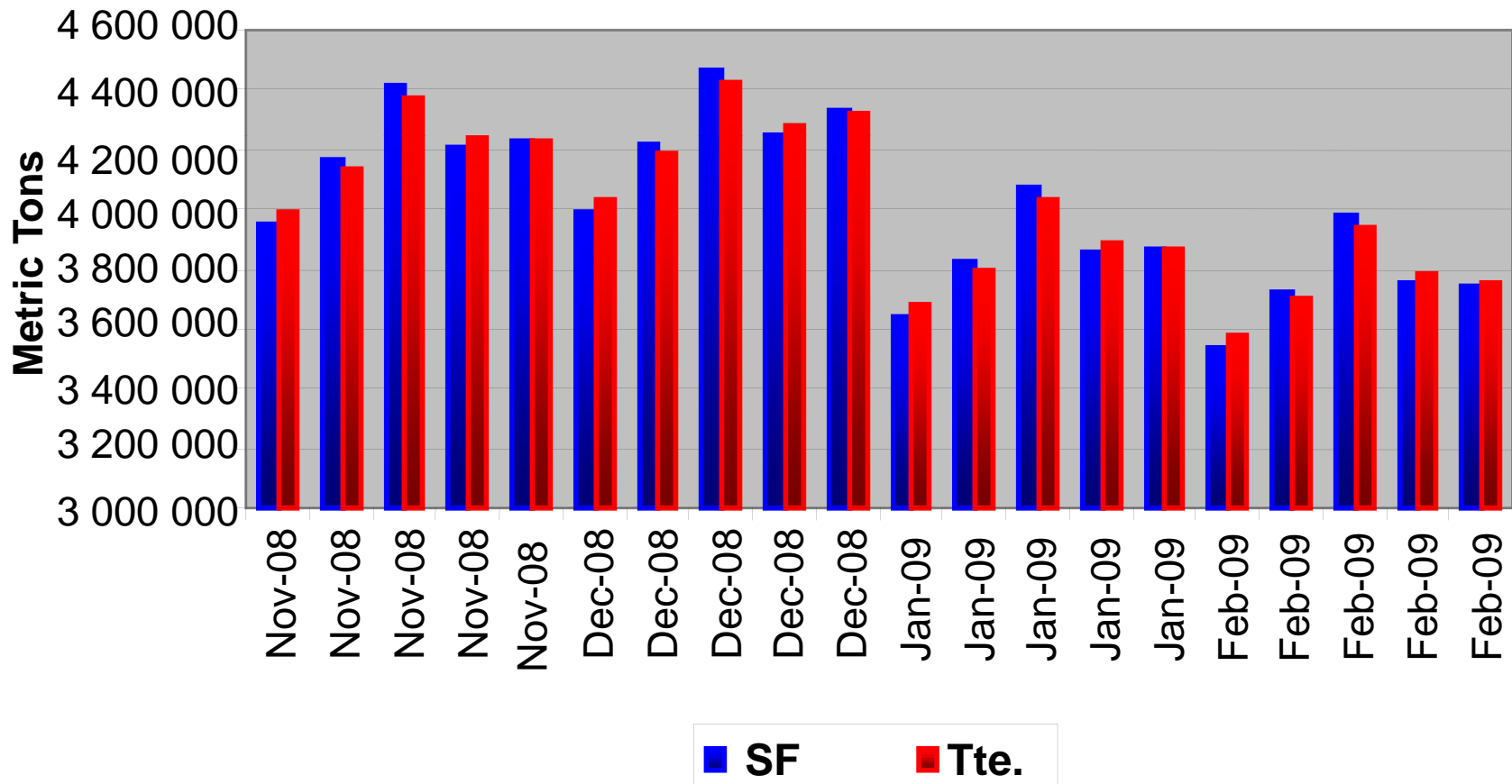
Project Summary



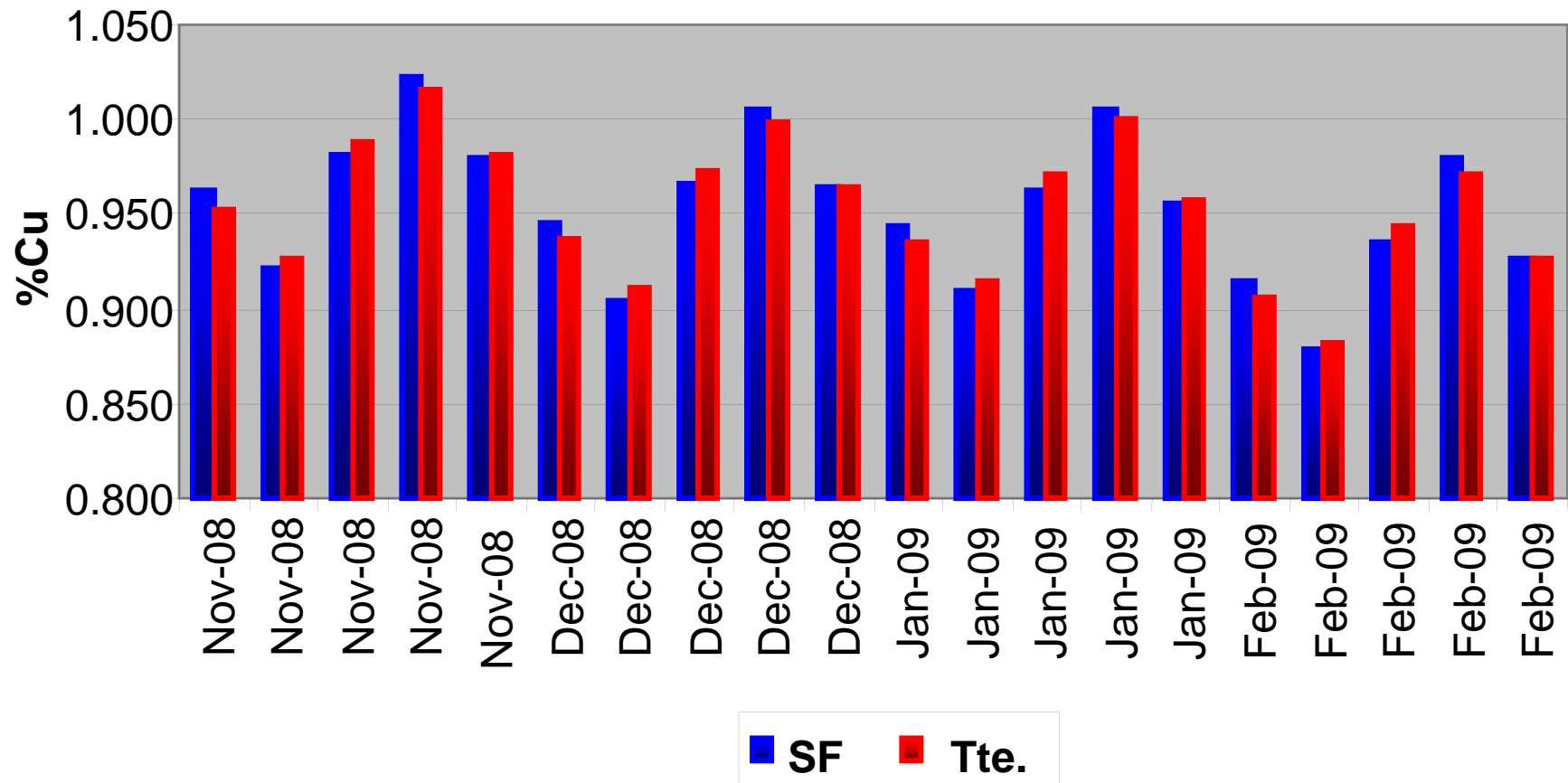
MODEL



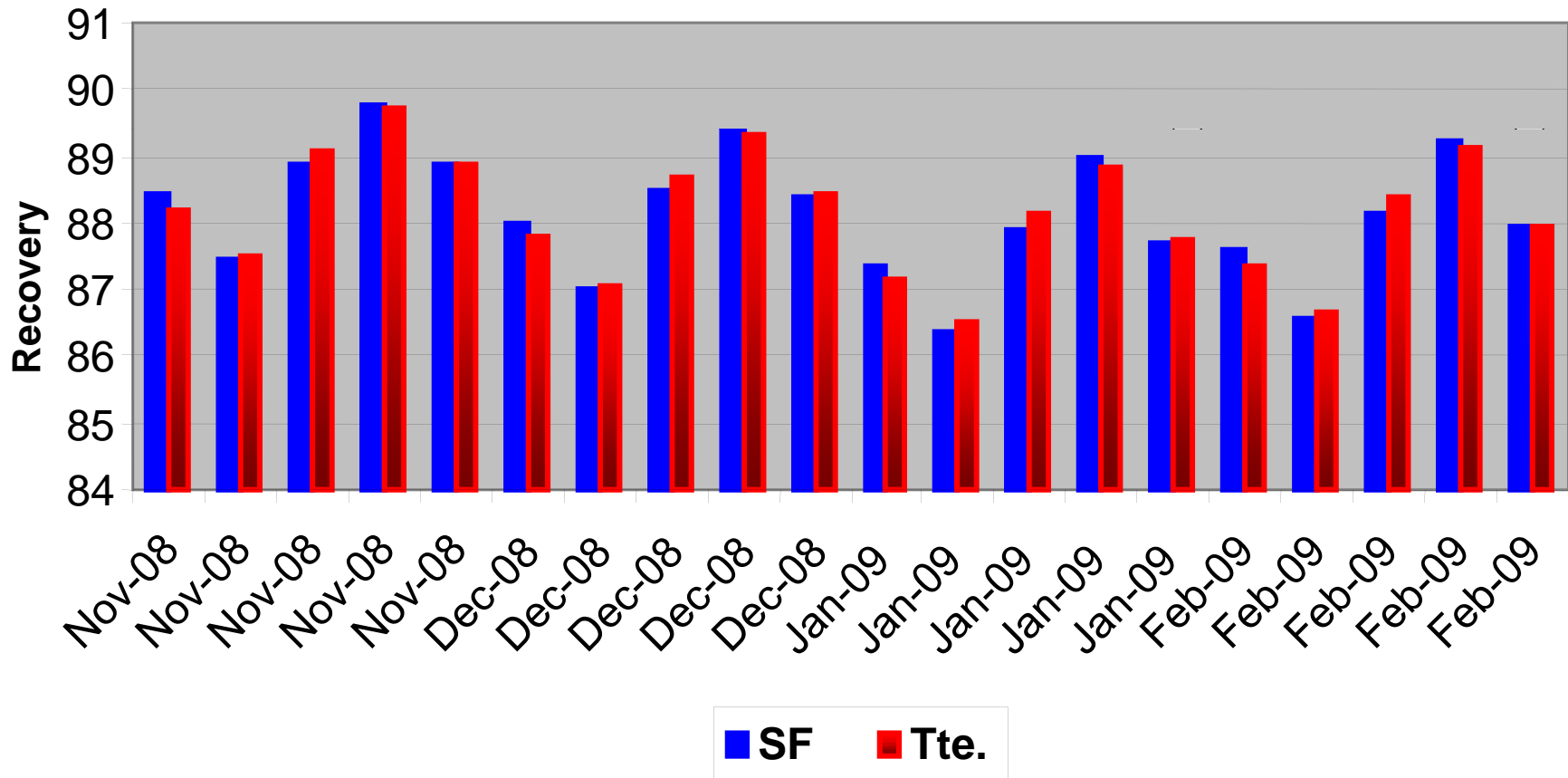
Metric Tons of Grinded Mineral for Nov-08 Feb-09 “ Official Balance “



%Cu in Grinded Mineral for Nov-08 Feb-09 “Official Balance”



RG. Plants Recovery “Official Balance”



Thank you

