



MINERIA

Compañía Minera del Pacífico

## **PURCHASE ORDER**

**PE2B-7200-KOCS-014**

**COMPUTATIONAL FLUID DYNAMICS (CFD) MODEL**

**PE2B PROJECT**

**April 09, 2018**



## 1. RECITALS

Compañía Minera del Pacífico S.A., hereinafter CAP Minería, request that **Fives Pillard**, hereinafter Pillard, the Contractor or Consultant, provide the services set down in this Purchase Order. The following documents are deemed an integral part of this Purchase Order, listed from highest to lowest priority:

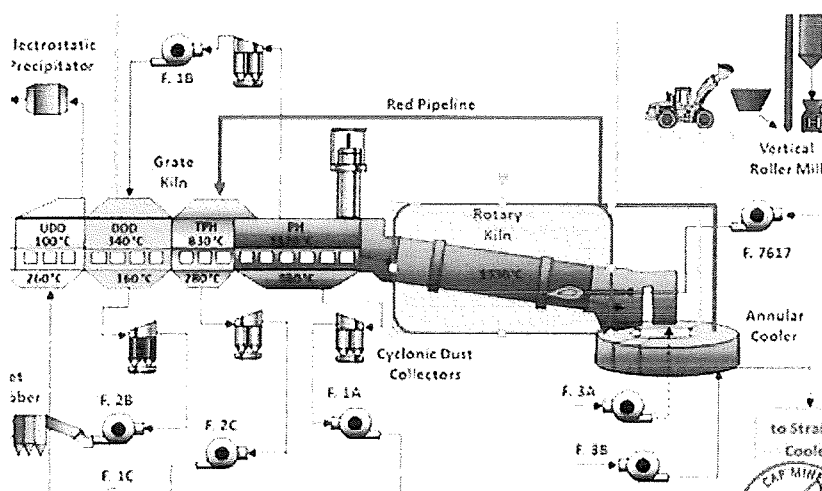
- This Purchase Order PE2B-7200-KOCS-014 "Computational Fluid Dynamics (CFD) Model."
- Letter of Intent (LOI) from CAP Minería to Fives Pillard dated March 6, 2018.
- Fives Pillard Offer (Offer Fives Pillard 160548 rev. 02) dated January 22, 2018.
- Specific conditions for Dispatch of Personnel at Site (AQ011-21).
- Fives Pillard site work schedule received March 16, 2018.
- Instructions on issuing Tax Documents (available at [www.capmineria.cl](http://www.capmineria.cl) under the tab "Suppliers and Contractors").
- Confidentiality Letter PE2B-7200-KOCS-014 dated 19 de marzo de 2018 (2 pages)

The conditions stipulated herein shall prevail over the conditions indicated by the Consultant in its offer should there be any discrepancy between the Consultant's quotation and this Purchase Order.

## 2. OBJECTIVE

The general objective is to create an integral digital model of the Plant pelletizing process using a computational fluid dynamics (CFD) model to simulate two different combustion systems and compare the technical benefit of each. This will lead to a decision, taking into account other economic variables, on the type of burner to utilize.

The computational domain will include the kiln and be limited to it.



*The zone of CFD study is as per sketch here below, in blue line*



The specific objectives of study are:

1. To establish an abatement level that can be **warranted** by Fives Pillard upon implementation of a direct-fired or indirect-fired LowNox Burner.
2. To obtain the **best abatement forecast** that Fives Pillard can make for the installation of a Selective Non-Catalytic Reduction (SNCR) system based on the choice of one of the LowNox burners indicated in No.1 above.

### 3. SPECIFICATIONS OF THE SERVICE

Without being restrictive or exclusionary, the service to provide by the Contractor is the service described below:

#### 3.1. Technical audit of the burner in the pelletizing furnace

This audit must encompass:

##### 3.1.1. Combustion Study

- ✓ Dimensional verification of the burner tips
- ✓ Elaboration of the baseline for process parameters
- ✓ Elaboration of the baseline for combustion gas emissions by burners
- ✓ Measurement of the flow and pressure of the coal mill fan.

##### 3.1.2. SNCR System

- ✓ Verification of the viability of the SNCR system: confirm the injection points, the chamber geometry, the process temperature and the particularity of the process.
- ✓ With a view towards preparing a scale test with a portable skid.
- ✓ Obtain an abatement level of NOx, can be warranted by Fives Pillard.

#### 3.2. Description of the CFD studies

The study consists of determining the NOx emissions by a coal burner, the indirect-fired design and the direct-fired design, using a computational fluid dynamics (CFD) model.

An interactive approach is used to maximize the efficiency of the modeling where the experience in previous similar projects completed by Fives Pillard is shared with the customer's project.

The CFD project begins with generating 3-D furnace drawings and operational data relating to the furnace intake and the boundary conditions in the following way:

- a) Site condition
  - ✓ Altitude



- b) Furnace
  - ✓ Geometric data
  - ✓ Performance conditions
- c) Burner
- d) Operating conditions

The "Base Case" will be defined based on information gathered and will be modeled and validated through observations at the plant.

The "Base Case" conditions will reproduce the actual furnace operation and process parameters.

### 3.3. Deliverables

Once all conditions of the CFD model have been agreed, a Base Case will be simulated within 6 weeks after issuance of the burner audit report.

A comprehensive final report will be delivered 8 weeks later that will include a technical description of all information on the simulations and the presentation, interpretation and discussion of all predicted and experimental results. The physical interpretation of these results will also be included in the report based on the specific parameters of the plant.

## 4. RESOURCES

### 4.1. To be provided by the Consultant

- Fives Pillard employee(s) will arrive on a date defined by agreement with the client after the issue of the Letter of Intent.
- Employee(s) must hold the proper licenses, have the skills and be capable of performing the scope of work covered by the offer.
- On-site assistance will be governed by the attached document AQ011-21 entitled "Specific Conditions to send employees to the site," issued October 5, 2012.

### 4.2. To be provided by CAP Minería

- A repair team and the spare parts necessary available on site, if requested.
- Lifting facilities and associated skilled employees, when necessary.
- A certified scaffold (for quick and safe access to the different elements to be inspected) and associated skilled employees, when necessary.
- A delimited, clean, safe and protected work area.
- Comforts: a source of food, compressed air, lighting, potable water, clothes locker, etc.
- Support to access the site and to obtain the necessary approvals and permits.



- A safety procedure during the week and especially on weekends.

## 5. PRICE

### 5.1. Fixed Price

CAP Minería will pay the Consultant the sum of € [REDACTED] plus tax, which will be the sole, total compensation for the services indicated in Article 3 actually performed and accepted to CAP Minería's satisfaction.

The price indicated in 5.1 above breaks down as follows:

Commercial Proposal			
Name of Work	Duration / Quantity	Unit Price (€)	Total Price (€)
Mobilization / Demobilization Expenses			Included
Number of working days on site	4	[REDACTED]	[REDACTED]
Number of travel days	2	[REDACTED]	[REDACTED]
Round-trip air fare	1	[REDACTED]	[REDACTED]
CFD studies for 100% coal combustion by a direct-fired and indirect-fired combustion burner	1	[REDACTED]	[REDACTED]
<b>Total Price (€)</b> (All tax withholdings and other taxes are excluded)			[REDACTED]

## 6. ADJUSTMENT

The price set in this Purchase Order will not be subject to any adjustment or variation during the term of the Purchase Order.

## 7. FORM OF PAYMENT

The form of payment is described as follows:

The Purchase Order price of € [REDACTED] will be paid against Payment Statements.

The Contractor must receive notice of acceptance of Payment Statement from the Service Operator before issuing any invoice.

The invoice must clearly include the Number of this Purchase Order and the Service Entry Sheet Number (HES) given by the Service Operator according to the previous paragraph.

The "Instructions on issuing Tax Documents" indicated in section 1 of this document must be followed for the correct issuance and forwarding of invoices.

The respective Invoices will be paid, after approval, to the Contractor 30 days after submission at the Accounting Operations Offices of CAP Minería.

CAP Minería pays its contractors and/or consultants through BCI Bank. Details of paid invoices can be viewed on that bank's website under the tab "Payee Query".

**The Payment Statements are as follows:**

- 70% of total contract price, with the advance of the services / works developed at the time of signing this purchase order.
- 30% of total contract price, against the issuance of the final CFD report, received in accordance with CAP Minería.

Fives Pillard shall issue an invoice for each Payment, after receiving the notice of acceptance.

The invoices will be paid by wire transfer 30 days date of each invoice.

**8. GUARANTEES**

**8.1. Reimbursement of the Advance**

Not Applicable

**8.2. Contract Performance Bond**

Not Applicable

**9. WITHHOLDING**

Not Applicable

**10. TERM OF THE SERVICES**

The total period for provision of the services is indicated below:

Burner Audit Report → visit to the site + 3 weeks after contract effectiveness or at reception of the downpayment

"Base Case" Model → Burner Audit Report + 6 weeks

Completion of the CFD Study → Validation of the "Base Case" Model+ 8 weeks

**11. OPERATION AND COORDINATION**

For administrative aspects, the Consultant must contact Mr. David Vergara, Contractual Management Engineer of the Project Development Division of CAP Minería, by e-mail to [REDACTED]. The technical counterparties will be Mr. Felipe Burgos, e-mail [REDACTED] and Mr. Gustavo Rodriguez, e-mail [REDACTED].

**12. WORK WARRANTY**

The Contractor warrants the work contracted and performed under this Purchase Order for a period of 6 months after satisfactory receipt thereof by CAP Minería. The Contractor must make any relevant corrections at no cost to CAP Minería should any anomaly eventually be found for which the Contractor is responsible.



**13. CONFIDENTIALITY**

The terms of confidentiality are contained in the "Confidentiality Letter" PE2B-7200-KOCS-014 dated March 19, 2018 (2 pages), as indicated in clause 1.

**14. LAW No. 20.393 ON CRIMINAL LIABILITY OF LEGAL PERSONS**

The Contractor declares that it is aware that CAP Minería has adopted a crime prevention model in accordance with Law No. 20.393 on the Criminal Liability of Legal Entities, and undertakes not to commit or participate as perpetrator, accomplice or concealer in the commission of any of the crimes indicated in the aforementioned Law. It also undertakes to extend this statement to all its directors, owners, employees and dependents

The Contractor Company undertakes, in addition, to notify the CAP Minería Crime Prevention Officer of any act or conduct of which it becomes aware in the context of the provision of its services to CAP Minería, through the complaint channel provided on the CAP Minería website

A breach of any of the above obligations will empower CAP Minería to terminate its contractual relationship with the Bidder immediately. The Bidder will have no right to demand any type of payment or indemnity.

**15. DOMICILE AND COUNTERPARTIES**

The parties state their domicile to be the city of Santiago for all purposes resulting from the application of this Purchase Order.

Two copies of this Purchase Order are issued, one remaining in possession of the Consultant and the other in possession of CAP Minería.

On behalf of CAP Minería

Name: ANDRÉS PALMO R.

Title: PROCUREMENT MANAGER

Signature: [Signature]

Date: April 10<sup>th</sup>, 2018



On behalf of the Contractor

Name: AUTRAN Thierry

Title: Service Director

Signature: [Signature]

Date: April 17<sup>th</sup>, 2018

**FIVESILLARD**  
13, Rue Raymond Teissère  
13272 MARSEILLE CEDEX 08