MELiSSA

TECHNICAL NOTE

TECHNICAL NOTE 85.10

Proposal for Prototype re-assembly and acceptance tests in MPP

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MELiSSA Pilot Plant Proposal for

"Call-Off Order: HPC1 installation and start-up in the MELiSSA Pilot Plant"

MPP Approval Loop :

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Change log :

Date	Issue	Reason of the change	Modified paragraphs
15/10/08	0	Creation	
6/11/08	1	Updates upon request by ESA : removal of the WP96.7 on overall control strategy and subsequent updates of payment plan and planning	
28/11/08	2	Update of SHERPA's payment plan, call off order starting date T0 and correction of typing errors in the global PSSA8 form	
05/12/2008	3	Update of overall payment plan	

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1. INTRODUCTION

The MELiSSA Pilot Plant (MPP) is located at the premises of Universitat Autònoma de Barcelona (UAB), in Bellaterra (Barcelona), Spain. A new laboratory has been recently set-up at UAB to host the MELiSSA Pilot Plant. This laboratory will enable to host the different compartments, first installed and operated individually, to be completely characterized, and then, step by step, integrated at different levels: liquid, solid and gas. The different compartments are developed by different MELiSSA partners or specific companies, according to the previous knowledge generated on them, and the specific needs and sizing made in order to achieve the integration scenario designed for the MPP in order to demonstrate the MELiSSA concept.

The present proposal is presented by UAB as a response to the ESA Call-off Order related to the "Installation and operation of the HPC1 of the MELiSSA Pilot Plant". Indeed, one of the hardware to be hosted at the MPP is the Higher Plant Compartment. This compartment has been developed during the last years by the MELiSSA partner University of Guelph (Canada). The compartment has been designed as a set of three higher plant chambers, in order to fulfill the needs of the MPP, such as the possibility to grow three different type of plants representative of the MELiSSA project (lettuce, beet and wheat). Recently, UoG has completed the construction of the hardware corresponding to first one of these compartments, referred to as HPC1 of the MPP. In brief the HPC1 will be transferred from Guelph to Barcelona, for its installation in the MPP.

The study proposed here will consist in the installation of HPC1 in the MPP, its functional validation and the realization of a preliminary plant culture. The HPC1 will first be installed in the MPP, connected to all utilities, completed in terms of hardware/software for its monitoring and control, and secondly it will be tested for its functionalities by growing a short term plant culture. As an output of the study, a proposal of the further tests to be carried out in the MPP to finalize the characterization of the operation of HPC1 will be presented. Some specificities of this work should be mentioned, particularly in respect to the control hardware. As mentioned, the HPC1 has been built in UoG (Canada), and the control hardware associated to it (Argus) is different from the one defined for all the compartments of the MPP (Schneider). For this reason, it will be necessary first to use the Argus control hardware to make sure that the hardware performs at the same level of operation than when it was built and tested in Canada, before its dismantling and transportation. Once this will be completed, the Argus system will be replaced by the Schneider one, and the functional and preliminary culture tests will be performed with the new control hardware. The obtained results will be analyzed, and the conclusions and further recommendations for the operation of the HPC will be elaborated. Finally, the installation of the HPC1 in the MPP, and the progress done in the definition of the integration strategy for the MPP will be the opportunity to review the complete global control for the MPP.

2. ABBREVIATIONS

WO Work Order
COO Call-Off Order
MPP MELiSSA Pilot Plant
UoG University of Guelph
UAB Universitat Autonoma de Barcelona
HPC Higher Plant Compartment

3. OBJECTIVES AND PARTNERS INVOLVED

According to the previous description, the objectives of this work order are the installation and integration of HPC1 in the MELiSSA Pilot Plant, the realization of functional characterization and preliminary culture tests. On this basis, a proposal for a complete characterization phase will be prepared.

The partners involved in the proposed work are:

UAB, as responsible for the MELiSSA Pilot Plant and the corresponding Frame Contract 19445/05/NL/CP will be the Prime Contractor. UAB will provide support and will overview the work development. Particularly, the staff of the MPP will be in charge of participating in the installation of the hardware in the MPP, will be in charge of the operation of HPC1 and performance of analyses, and in the definition and supervision of the tests and the analysis of the obtained results.
University of Guelph (UoG), as provider of HPC1, will play a major role in the development of the work. After the shipment and reception in the MPP, UoG will participate in the preliminary assembly of the equipment, previous to its connection to the MPP utilities. Also, UoG will be in charge of the reconnection of the Argus control system to the HPC1 in the MPP, of the reconnection of the hydroponics systems, the test of the different elements under the control system, the installation of the control software and the planning for hot/chilled water connections. After completion of all plumbing and connection to utilities, UoG will be responsible of the final connection of HPC1 and its functional tests. Finally, UoG will support MPP personnel in the Argus-Schneider conversion.
ANGSTROM is an engineering company. They will participate in the reassembly of HPC1, the mounting of instruments or parts procured by UAB in Europe, and in the checks to be done to validate the correct operation of the reassembled HPC1. They will also assist UAB in the reconnection of HPC1 to MPP utilities.
The company chosen to carry out the tasks defined as “Engineering design of the MELiSSA Pilot Plant”, giving support to UAB in the installation of this particular compartment and the performance of these particular tasks, is CIFA (Teià, Barcelona)
SHERPA Engineering (SHERPA) (Nanterre, France) is one of the MELiSSA Partners, involved in control issues at compartment level and at plant level.

NTE (Lliçà d'Amunt, Spain) is a specialized company in Space instrumentation and engineering that will participate in some of the tasks related to hardware and software development for monitoring and control.
ENGINSOFT (Trento, Italy) is a company involved in the specifications and protocols of HPC1 mapping. The results from this mapping will be further used by Enginsoft in the modeling of HPC.

CIFA will be UAB's supplier.
SHERPA and UoG will be UAB subcontractors.
ANGSTROM will be UoG subcontractor
NTE will be SHERPA's subcontractor.
ENGINSOFT will participate as SHERPA's consultant.
A more detailed description of the work to be done is presented in the next section and in the corresponding PSS A20 forms.

4. APPLICABLE DOCUMENTS

In the work to be performed, a number of documents linked to the MPP, where the general characteristics, utilities, hardware, etc., are described in detail, will be considered as applicable documents:

- the "MELISSA Pilot Plant General Resources, Interfaces and Environment (MPP-TN-08-0001)" document,
- the inventory list, including location of all MELISSA pilot plant devices (MPP-LIST-08-0001)
- the list of harmonized hardware to be used in the MELiSSA Pilot Plant (MPP-LIST-08-0002)
- the following documents related to quality management and operation in the MPP
    - MPP-QA-07-0001 Quality Manual
    - MPP-QA-07-0003 Rules for Good Laboratory Practices

5. WORK BREAKDOWN STRUCTURE

The work to be carried out will be covered in the following WPs:

WP-96.1. Reassembly and installation of HPC-1 in the MPP
WP-96.2. Functional validation of HPC1 with Argus Controller
WP-96.3. Replacement of the Argus Controller by the Schneider PLC
WP-96.4. Functional validation of HPC1 with Schneider-PLC Controller
WP-96.5. Preliminary culture campaign in HPC-1
WP-96.6. HPC1 – conclusion and perspectives

Finally, overall management and coordination activities are also considered:

WP-96.0. Management. The activities to be developed in this WO concern a number of MELiSSA partners:, UoG, SHERPA, UAB, as well as at least four additional companies, NTE, CIFA, ANGSTROM and ENGINSOFT. There is therefore a need for coordination of all the activities, in order to have a timely development of the work. In addition, the activities of this WO have to be coordinated with the overall operation and maintenance of the MPP.

WORK PACKAGE DESCRIPTION		**form N° PSS-A20**
PROJECT: Frame Contract Operation and Maintenance of the MELiSSA Pilot Plant. Contract 19445/05/NL/CP	**CALL-OFF ORDER:** " Installation and operation of HPC-1 in the MPP"	**W.P. REF.:** 96.0
W.P. TITLE: Management		**SHEET** 1 **OF** 1
CONTRACTOR: UAB		**ISSUE REF:** 1
MAJOR CONSTITUENT: Installation and start-up of HPC-1 in the MPP		
START EVENT: T0	**DATE:** 01.12.08	
END EVENT: T0+8.0	**DATE:** 01.08.09	
W.P. MANAGER: Francesc Gòdia (UAB)		**ISSUE DATE:** 28-11-08

INPUTS: All applicable and reference documents.

TASKS:

- To follow-up all the evolution of the work for the installation and operation of the first HPC built at University of Guelph, in the MELiSSA Pilot Plant, as described in this proposal
- To prepare all Technical Notes and other deliverables as planned under this proposal
- To manage the relations with all sub-contractors and consultants

TASKS RESPONSIBLES: Francesc Gòdia, Arnaud Fossen, Enrique Peiro

OUTPUTS: Management of these Call-off Order activities

WORK PACKAGE DESCRIPTION		**form N° PSS-A20**
PROJECT: Frame Contract Operation and Maintenance of the MELiSSA Pilot Plant. Contract 19445/05/NL/CP	**CALL-OFF ORDER:** " Installation and operation of HPC-1 in the MPP"	**W.P. REF.:** 96.1
W.P. TITLE: Reassembly of HPC 1		**SHEET** 1 **OF** 1
CONTRACTOR: UAB		**ISSUE REF:** 1
MAJOR CONSTITUENT: Installation and start-up of HPC-1 in the MPP		
START EVENT: T0	**DATE:** 01.12.08	
END EVENT: T0 + 2.0 month	**DATE:** 01.02.09	
W.P. MANAGER: Mike Stasiak (UoG)		**ISSUE DATE:** 28-11-08

INPUTS:

- HPC1 design and construction acceptance datapackage
- HPC1 acceptance datapackage
- HPC1 modules delivered by UoG on MPP dock and unpacked

TASKS:

The following tasks are identified, with the task responsible organizations in brackets:

- Unpackaging of crated modules (UoG)
- Visual inspection of the hardware delivered and unpacked (UoG/UAB)
- Reassembly of the modules and parts that were split for transportation, by Angstrom as a subcontractor of UoG (i.e.limited to modules and parts actually disassembled before shipment) (UoG/Angstrom)
- Planning of Argus control system and lighting installation (UoG/UAB)
- Connection of HPC1 to the lab utilities,(UAB/subcontrators) including among others:
    - electrical power interface cabinet (EPIC) installation
    - Argus wiring cabinet mounting and main electrical connection,
    - lamp ballast and lamp mounting and wiring,
    - connection of chilled/hot water lines and proportional valves,
    - insulation of hot/chilled water lines,

- connection of gases supply.

- Reconnection of the Argus controller (UAB/UoG) and functional checks of the connections (UoG/UAB)
- Functional check and remounting of the instruments that were dismounted for transportation (i.e. limited to items actually assembled by UoG in UoG facilities) and of the specific items procured by UAB in Europe (UoG)
- Up-date of the MPP general resources and interfaces document according to the changes introduced to install the HPC-1 (UAB)
- Training of MPP staff, SHERPA and NTE (according to their particular fields of competence) by UoG and Angstrom (UoG/Angstrom), including: HPC operation, HPC maintenance and ancillary equipment use.
- All the relevant information from this WP including a detailed description of the tasks performed, check lists about assembly, wiring, mechanical assembly and connection testing will be contained in TN-96.1

TASKS RESPONSIBLES: M. Stasiak, J. Lawson (for UoG), Enrique Peiro (for UAB), A. Campbell (for Angstrom)

The task responsibles will report to the WP manager regularly in writing about the progress of the corresponding tasks.. UoG as the WP manager will report as well regularly in writing to UAB about the progress of the whole WP, according to the conditions included in the particular contract with UAB.

OUTPUTS:

- Reassembled HW with instruments and Argus controller, ready for Test Readiness Review previous to Functional Validation.
- TN-96.1 "Results of chamber reassembly at UAB"
- Updated MPP General Resources and Interfaces (MPP-TN 08-0001) document.

WORK PACKAGE DESCRIPTION		**form N° PSS-A20**
PROJECT: Frame Contract Operation and Maintenance of the MELiSSA Pilot Plant. Contract 19445/05/NL/CP	**CALL-OFF ORDER:** " Installation and operation of HPC-1 in the MPP"	**W.P. REF.:** 96.2
W.P. TITLE: Functional validation of HPC1 with Argus Controller		**SHEET** 1 **OF** 1
CONTRACTOR: UAB		**ISSUE REF:** 1
MAJOR CONSTITUENT: Installation and start-up of HPC-1 in the MPP		
START EVENT: T0	**DATE:** 01.12.08	
END EVENT: T0 + 3.0 months	**DATE:** 01.03.09	
W.P. MANAGER: Mike Stasiak (UoG)		**ISSUE DATE:** 28-11-08

INPUTS: TN 85.81, TN85.83, TN 96.1

TASKS:

The objective of this work package is to duplicate the performance of the functional tests, as performed in UoG before shipment of HPC1 to the MPP, in order to validate that shipment and reassembly of HPC1 did not affect its performances. Those functional tests will be closely based on TN 85.81.

This WP will include all preparatory tasks to the performance of the functional tests:

- Preparation of a Test-plan and Protocols document (TN 96.2), based on TN 85.81 (UAB/UoG) and on protocols as used previously by UoG. Control loop tests will have the participation of Sherpa.
- Preparation of protocols and procedures for lettuce cultivation (from seeding up to harvesting) (TN96.3) (UAB/UoG)
- Preparation of sampling and analysis protocols and procedures (TN 96.4), for biomass (i.e lettuce), nutrient solution and gas phase. The protocols prepared will allow mass-balance evaluation on Carbon and Nitrogen (UAB/UoG)
- Nursing of crops (Rk: cultivar will be the same as the one used in UoG)
- As an additional task of this WP, Open Loop and Closed Loop Tests will be defined in cooperation with Sherpa and Closed loop ones will be analysed as well from a Control point of view, performance and robustness (SHERPA).

A Test Readiness Review will be convened with ESA, including the review of the TRR Datapackage (TN 96.1, .2, .3, .4,) and the review of HPC1 hardware.
Functional tests will be performed according to the TRR datapackage.

A crop test for the validation of the control system will be carried out as well within this WP: it is foreseen 1 week tests with crops for control loops validation, i.e. time necessary to validate close loop behaviour (T, H, CO2 mainly) with crops.

Any deviation of the present test results from the tests results obtained in UoG will be highlighted and commented, based on a first draft issued by the UoG. It will be concluded in each case if the deviation is acceptable or results from re-assembly issues.

All tests will be performed under the responsibility of UoG, with the involvement of MPP team.
Tests performances will be documented in TN 96.5, including, as-run procedures and test results.

An acceptance review will be convened with ESA, including but not limited to the review of the AR Datapackage (TN 96.5).

TASKS RESPONSIBLES: M. Stasiak, J. Lawson (for UoG), Enrique Peiro (for UAB), O. Gerbi (for Sherpa).

The task responsibles will report to the WP manager regularly in writing about the progress of the corresponding tasks. UoG as the WP manager will report as well regularly in writing to UAB about the progress of the whole WP, according to the conditions included in the particular contract with UAB.

All the documents below mentioned as outputs, will be based on a first draft or input delivered by UoG to UAB covering the critical points to be included in each of them based on their previous experience with the HPC in Guelph. The schedule of delivery of the inputs for each section of the TN (e.g. Test Plan, Test Protocols, Test Results) will be different, linked to the planning of the corresponding tasks.

OUTPUTS:

- TN 96.2 "Functional Test Plan and Test Protocols with Argus controller"
- TN 96.3 "Test Protocols and procedures for lettuce cultivation"
- TN 96.4 "Sampling and analysis Protocols and Procedures for biomass, nutrient solution and gas phase"
- TN 96.5 : Functional testing with Argus Controller – As-run procedures, Test results and final Test report.
- HPC1 functionally validated

WORK PACKAGE DESCRIPTION		**form No PSS-A20**
PROJECT: Frame Contract Operation and Maintenance of the MELiSSA Pilot Plant. Contract 19445/05/NL/CP	**CALL-OFF ORDER:** " Installation and operation of HPC-1 in the MPP"	**W.P. REF.:** 96.3
W.P. TITLE: Replacement of the Argus Controller by the Schneider PLC		**SHEET** 1 **OF** 1
CONTRACTOR: UAB		**ISSUE REF:** 1
MAJOR CONSTITUENT: Installation and start-up of HPC-1 in the MPP		
START EVENT: T0+3.0 months	**DATE:** 01.03.09	
END EVENT: T0 + 4.0 months	**DATE:** 01.04.09	
W.P. MANAGER: Olivier Gerbi (SHERPA)		**ISSUE DATE:** 28-11-08

INPUTS:

- TNs included in Contract 19445/Call-Off Order 1/HPC Control
- TNs from previous WP

TASKS:

The future integration of the complete MELiSSA loop in the MPP requires the full harmonization of the control (hardware and software) of the various MELiSSA compartments. As a consequence, a Schneider-PLC based control has been developed in the frame of Contract 19445/Call-Off Order 1/HPC Control.

The aim of the present WP is to switch from the Argus Controller to the Schneider one.

Tasks are including:

a) Hardware:

- Disconnection of the Argus Controller (UAB and UoG)
- Argus controller return to UoG (UAB/UoG)
- Connection of the EPIC (Electrical Power Interface Cabinet) to the Schneider PLC Cabinet (NTE)
- Connection of the Schneider PLC Cabinet to the HPC Intermediate I/O Interface wiring panels (NTE)
- A new Data Acquisition System will be purchased for HPC operation (UAB) following the recommendations by SHERPA/NTE. This system will be implemented by SHERPA and NTE.

b) Software:

- From the training demonstration (WP 96.1), a new remote HMI (ifix) for the HPC will be designed, installed and verified with HPC and EPIC connected (NTE). Local HMI is not considered in this phase.
- A new iFix 3.0 unlimited license will be provided and installed in the Pilot Plant server (NTE).
- After the development of the HMI, modification of Concept program in the PLC to take into account the HMI inputs should be carried out, and validation of the exchange between HMI and PLC behaviour will then be performed (NTE/SHERPA).
- A new HPC Software manual will be delivered (NTE).
- Update of the Control laws: from the data acquisition of Argus, Open Loop tests will be analysed in order to get internal models for control laws; Closed Loop will be analysed for getting a reference for the comparison with the new CS; HPC Control model will be updated; and PCR Library (SHERPA Predictive Control) for Concept will be fully updated with SHERPA latest version (SHERPA)
- Control model and simulations done in COO1 should be updated because of hardware modification or possible control requirement update

As a result of these tasks, the former CS Argus + HMI Titan will be replaced by the CS Schneider and Sherpa Control laws + ifix HMI software. A Design review between UAB/Sherpa/NTE is foreseen.

This WP also includes the preparation for the Control Functional testing of the Schneider/Sherpa Control System (SHERPA/UAB): TN 95.41 Test Plan document will be updated considering the hardware modification and requirement adjustment seen in WP 96.1.

A Test Readiness Review will be organized, before the performance of the tests as approved in the updated TN 95.41. The Test Readiness Review datapackage will include:

- Updated TN 95.41 (approved by ESA)
- All documentation corresponding to the PLC (in its rack) integrated in the HPC and electrical schematics, wiring tables, mechanical design and interfaces.

TASKS RESPONSIBLES: J. Lawson (for UoG), Enrique Peiro (for UAB), Olivier Gerbi (for SHERPA), Toni Lopez (for NTE)

The task responsibles will report to the WP manager regularly in writing about the progress of the corresponding tasks. SHERPA as the WP manager will report as well regularly to UAB in writing about the progress of the whole WP, according to the conditions included in the particular contract with UAB.

OUTPUTS:

- HPC1 with Schneider PLC Controller
- Documentation of TRR datapackage corresponding to the PLC integrated with the HPC and electrical schematics, wiring tables, mechanical design and interfaces.
- Updated TN 95.41: Control system Functional validation Test Plan
- Updated Control Software, Tag List
- HMI design, HMI User Manual
- HPC New Software Manual

WORK PACKAGE DESCRIPTION		**form No PSS-A20**
PROJECT: Frame Contract Operation and Maintenance of the MELiSSA Pilot Plant. Contract 19445/05/NL/CP	**CALL-OFF ORDER:** " Installation and operation of HPC-1 in the MPP"	**W.P. REF.:** 96.4
W.P. TITLE: Functional validation of HPC1 with Schneider-PLC Controller		**SHEET** 1 **OF** 1
CONTRACTOR: UAB		**ISSUE REF:** 1
MAJOR CONSTITUENT: Installation and operation of HPC-1 in the MPP		
START EVENT: T0+3.5 months	**DATE:** 15.03.09	
END EVENT: T0 + 5.5 months	**DATE:** 15.05.09	
W.P. MANAGER: Enrique Peiro (UAB)		**ISSUE DATE:** 28-11-08

INPUTS: all TNs from previous WPs

TASKS:

The objective of this work package is to duplicate the performance of the functional tests, as performed with the Argus controller in WP 96.2 (TN 96.2). The actual Test Plan, as described in TN 96.2, will be updated by:

- adding complementary tests
- cancelling some of the tests,

Taking into account the impact of controller change and the new HMI on them.

The actual Functional Test Plan will be documented in TN 96.6 and associated Test Protocols in TN 96.7

Nursing of crops again with the same cultivar used in UoG will be required as a preparatory task to the performance of the functional tests.

This WP will cover as well additional tasks regarding the mapping of the HPC:

- Preparation of requirements (TN 96.8) (Enginsoft), protocols and procedures for the mapping of HPC1 (TN 96.9) (UAB/UoG/Enginsoft/SHERPA). Requirements will not be limited to the mapping allowed by the current hardware characteristics of HPC1 (i.e they will cover temperature, light intensity, humidity, air velocity).
- Purchase and implementation of the measurement set-up (frame and sensors) as defined in the mapping protocols and procedures ; the design of the measurement set-up for the mapping will be validated by EnginSoft and SHERPA before being built
- According to EnginSoft requirements, some specific modification in the Control

Software could be temporarily done by SHERPA.

The Data acquisition system should be operational before any test. For open loop test and Mapping, a faster Data acquisition system will be provided by UAB upon recommendations by SHERPA/NTE.

A Test Readiness Review will be convened with ESA, including the review of the TRR Datapackage (TN 96.6, 96.7) and additional documentation from WP 96.3 (updated TN 95.41 and all documentation corresponding to the PLC integrated in the HPC) and the review of HPC1 hardware (mainly controller hardware).

Functional tests will be performed according to the TRR datapackage and TNs from WP96.2 which are applicable to WP 96.4.(TN 96.3 "Test Protocols and procedures for lettuce cultivation", and 96.4: "Sampling and analysis Protocols and Procedures for biomass, nutrient solution and gas phase"). Any deviation of the present test results from the tests results obtained with the Argus Controller will be highlighted and commented. It will be concluded in each case if the deviation is acceptable or not.

The system will be firstly validated without any crop (all control loops).

Before any test with crops in the chamber, a mapping of HPC1 will be performed by UAB and subcontractors, based on Temperature and Light Intensity, according to the specifications defined in TN 96.8 and 96.9

Mapping as-run procedures and results will be documented in TN 96.10. SHERPA will attend the mapping for Control system assistance.

Finally, a crop test for the validation of the control system will be carried out as well within this WP: it is foreseen 1 week tests with crops for control loops validation, i.e. time necessary to validate close loop behaviour (T, H, CO2 mainly) with crops.

After the performance of the tests, a test report including as-run procedures will be prepared (TN 96.11) to demonstrate the compliance with the requirements described in TN 95.11 (corresponding to COO1).

An acceptance review will be convened with ESA, including but not limited to the review of the AR Datapackage (TN 96.11).

All tests will be performed under the responsibility of UAB.

TASKS RESPONSIBLES: Enrique Peiro (for UAB), Olivier Gerbi (for SHERPA), Toni Lopez (for NTE). UoG will be potentially involved for contingencies that would require their expertise.

The task responsibles will report to the WP manager regularly in writing about the progress of the corresponding tasks.

OUTPUTS:

- TN 96.6: "Functional Test Plan with Schneider controller"
- TN 96.7: "Functional Test Protocols with Schneider controller"
- TN 96.8 "Requirements for the mapping of HPC1"
- TN 96.9 "Protocols and procedures for the mapping of HPC1"
- TN 96.10 "Mapping as-run procedures and results"
- TN 96.11: Functional testing with Schneider-PLC Controller – Test report

HPC1 functionally validated with Schneider Controller

WORK PACKAGE DESCRIPTION		**form N° PSS-A20**
PROJECT: Frame Contract Operation and Maintenance of the MELiSSA Pilot Plant. Contract 19445/05/NL/CP	**CALL-OFF ORDER:** " Installation and operation of HPC-1 in the MPP"	**W.P. REF.:** 96.5
W.P. TITLE: Preliminary culture campaigns in HPC-1		**SHEET** 1 **OF** 1
CONTRACTOR: UAB		**ISSUE REF:** 1
MAJOR CONSTITUENT: Installation and operation of HPC-1 in the MPP		
START EVENT: T0 +5.5 months	**DATE:** 15.05.09	
END EVENT: T0 +7.5 months	**DATE:** 15.07.09	
W.P. MANAGER: Enrique Peiro (UAB)		**ISSUE DATE:** 28-11-08

INPUTS: Outputs from all previous WP. All scientific and technical documentation in respect to the culture of lettuce in HPC, particularly in UoG premises.

TASKS:
To assess (i.e preliminary assessment) the performance of the HPC1, it is proposed to cultivate one additional batch of lettuce according to TN 96.3 and 96.4.
Tasks are including:

- performance of one batch culture
- assessment of the results, comparison of HPC-1 performances with the ones of the chambers used by UoG

Cultivation performance and results will be documented in TN 96.14, including as-run procedures.

SHERPA and NTE assistance is potentially required in this WP corresponding to the adjustment period for the control software (ifix and Concept)

TASKS RESPONSIBLE: Enrique Peiro (UAB), M. Stasiak (UoG), O. Gerbi (SHERPA), T.López (NTE)
The task responsible persons will report to the WP manager regularly in writing about the progress of the corresponding tasks.

All the documents below mentioned as outputs, will be based on a preliminary draft or output delivered by UoG to UAB covering the critical points to be included in each of them based on their previous experience with the HPC in Guelph.

OUTPUTS:

- TN 96.12 : Cultivation as-run procedures, Test results and final Test report.

WORK PACKAGE DESCRIPTION		form N° PSS-A20
PROJECT: Frame Contract Operation and Maintenance of the MELiSSA Pilot Plant. Contract 19445/05/NL/CP	**CALL-OFF ORDER:** " Installation and operation of HPC-1 in the MPP"	**W.P. REF.:** 96.6
W.P. TITLE: HPC1 – conclusion and perspectives		**SHEET** 1 **OF** 1
CONTRACTOR: UAB		**ISSUE REF:** 1
MAJOR CONSTITUENT: Installation and operation of HPC-1 in the MPP		
START EVENT: T0 +7.5 month	**DATE:** 15.07.09	
END EVENT: T0 +8.0 months	**DATE:** 01.08.09	
W.P. MANAGER: Enrique Peiro (UAB)		**ISSUE DATE:** 28-11-08

INPUTS: Outputs from all previous WP.

TASKS:
The objective of this WP is to make an assessment of all data , results, collected under the current Call-Off Order.
Conclusions will be derived in terms of:

- Capabilities and limitations of HPC1 and ancillary equipment.
- Potential modifications/improvements of control, hardware and protocols.

TASKS RESPONSIBLE: Enrique Peiro (UAB), Olivier Gerbi (SHERPA), Toni Lopez (NTE), G. Perna (Enginsoft), M. Stasiak (UoG)

The task responsibles will report to the WP manager in written about the progress of the corresponding tasks.

All the documents below mentioned as outputs, will be based on a first draft or output delivered by UoG to UAB covering the critical points to be included in each of them based on their previous experience with the HPC in Guelph.

OUTPUTS:

- TN-96.13: HPC1 – conclusions and perspectives

6. PLANNING

The previous activities defined in the previous WPs are proposed for a complete duration of 8 months, according to the following planning.

		T0															
		1-12-08	15-12-08	1-1-09	15-1-09	1-2-09	15-2-09	1-3-09	15-3-09	1-4-09	15-4-09	1-5-09	15-5-09	1-6-09	15-6-09	1-7-09	15-7-09
WP96.0	Management																
WP96.1	Reassembly of HPC1																
WP96.2	Functional validation of HPC1 with Argus Controller																
WP96.3	Replacement of the Argus Controller by the Schneider PLC																
WP96.4	Functional Validation of HPC1 with Schneider PLC Controller																
WP96.5	Preliminary culture campaigns in HPC1																
WP96.6	HPC1 - conclusions and perspectives																

7. PLANNING OF MEETINGS

A number of meetings are planned for the proper coordination of the work to be performed, as presented in the following table. As much as possible, tele or video conference will be used to perform the meetings, optimizing the number of meetings involving traveling of the various participants in the WO.

Date	**Topic**	**Participants**					
		UAB	**UoG**	**SHERPA**	**NTE**	**ES**	**ESA**
T0	KOM	√	√	√	√	√	√
T0 + 2	WP96.2 Review of HPC1 installation and test readiness review for functional tets	√	√	√	√		√
T0+3	WP96.2 Acceptance review with Argus controller	√	√	√	√		√
T0+4	WP96.4 Test readiness review with Schneider controller	√	√	√	√	√	√
T0+5,5	WP96.4 Acceptance review with Schneider controller and test readiness review for preliminary tests	√	√	√	√	√	√
T0+8	WP96.6 Conclusions and perspectives	√	√	√			√

8. KEY PERSONNEL

The overall manager of the MELiSSA Pilot Plant at UAB is Prof. Francesc Gòdia. He will be responsible of the tasks of management of the COO.

Mr. Enrique Peiro is the Pilot Plant Technical Manager. He will perform tasks of technical management and engineering in the COO.

Mr. Arnaud Fossen is the ESA Operation Representative at the MELiSSA Pilot Plant. He will perform tasks of planification, quality, reporting and information management in the COO

Mr. Raúl Moyano is a technician in the MELiSSA Pilot Plant. He will contribute to the tasks of installation of HPC1 in the MPP, connection to utilities, connection of the control systems and general operation.

Ms. Vanessa García is a technician in the MELiSSA Pilot Plant. She will contribute to the performance of analysis tasks and operation and maintenance of HPC1 during the different tests.

Ms Natalia Tikhomirova is a post-doc researcher working for the MELiSSA Pilot Plant. She will be involved in the follow-up of the HPC1 operation, elaboration of procedures and protocols, and participate to the tests involving crops inside the chamber.

Mr. Mike Stasiak will be the responsible for the technical contributions of UNIVERSITY OF GUELPH as sub-contractor.

Mr. Olivier Gerbi will be the responsible for the technical contributions of SHERPA ENGINEERING as sub-contractor.

Mr. Antoni López will be the responsible for the technical contributions of NTE (Nuevas Tecnologías Espaciales) as sub-contractor for SHERPA ENGINEERING.

9. LIST OF DELIVERABLES

- TN 96.1 " Results of chamber reassembly at UAB"
- Updated MPP General Resources and Interfaces (MPP-TN 08-0001) document
- TN 96.2 "Functional Test Plan and Test Protocols with Argus controller"
- TN 96.3 "Test Protocols and procedures for lettuce cultivation"
- TN 96.4 "Sampling and analysis Protocols and Procedures for biomass, nutrient solution and gas phase"
- TN 96.5 : Functional testing with Argus Controller – As-run procedures, Test results and final Test report.
- Documentation of Test Readiness Review datapackage corresponding to the Schneider PLC integrated with the HPC and electrical schematics, wiring tables, mechanical design and interfaces.
- Updated TN 95.41: Control system Functional validation Test Plan
- Updated Control Software, Tag List
- HMI design, HMI User Manual
- HPC New Software Manual
- TN 96.6: "Functional Test Plan with Schneider controller"
- TN 96.7: "Functional Test Protocols with Schneider controller"

- TN 96.8 "Requirements for the mapping of HPC1"
- TN 96.9 "Protocols and procedures for the mapping of HPC1"
- TN 96.10 "Mapping as-run procedures and results"
- TN 96.11: Functional testing with Schneider-PLC Controller – Test report
- TN 96.12: Cultivation as-run procedures, Test results and final Test report.
- TN-96.13: HPC1 – conclusions and perspectives

10. FINANCIAL PROPOSAL

The costs of this work for ESA is 253 101 Euro, and is divided according to the tasks of the different parties (the corresponding PSS forms are at the end of this proposal) :

UAB costs are covering its activities for a total cost for ESA of 52 146 Euro. These costs do not include the labour costs of the personnel already included in the WO Laboratory Operation and Maintenance, provided for the general support to the operation of the various Compartments. The work hours provided in the corresponding PSS are given as information of the effort devoted to the different tasks, but are not charged to the WO cost. The costs due to the engineering activities for installation of HPC1 in the MPP and the purchase of a data acquisition system are financed by Spanish contribution up to 67 670€.

UoG costs are covering its activities, for a total cost of 71 399 Euros.

SHERPA Engineering costs (costs actually charged on this WO) are covering its activities, for a total cost of 83 350 Euros.

NTE costs are covering its activities, for a total cost of 46 206 Euros.

11. PAYMENT PLANS

11.1 Overall payment plan

Overall cost for ESA 253 101€

Dec 08	35%	88585 €	Advance payment
Jan 09	16%	40474 €	Progress Payment 1 –after reassembly of the HPC1 modules with instruments
Mar 09	30%	75042 €	Progress Payment 2 - After the completion of WP 96.1, WP96.2 , WP96.3 and approval of associated documentation
Aug 09	19%	49000 €	Final Payment - Finalization of the WO and acceptance of deliverables

11.2 Detailed payment plans per partner

UAB : total cost for ESA 52 146€

Dec 08	5 235 €	Advance payment
Jan 09	5 193 €	Progress payment 1 - after reassembly of HPC1 modules with instruments
Mar 09	20 859 €	Progress Payment 2 - After the completion of WP 96.2 and approval of associated documentation
Aug 09	20 859 €	Final Payment - Finalization of the WO and acceptance of deliverables

UoG: total cost for ESA 71 399€

Jan 09	21 420€	Advance payment + Progress payment 1 – after reassembly of HPC1 modules with instruments
Mar 09	35 700€	Progress Payment 2 - Acceptance of the deliverables of WP96.1,WP96.2,WP96.3
Aug 09	14 279€	Final Payment - Finalization of the WO and acceptance of deliverables

SHERPA ENGINEERING : total cost for ESA 83 350€

Dec 08	83 350€	Full payment

NTE: total cost for ESA 46 206€

Jan 09	13 861€	Advance payment + Progress payment 1 – after reassembly of HPC1 modules with instruments
Mar 09	18 483€	Progress Payment 2 - Acceptance of deliverables of WP 96.3
Aug 09	13 862€	Final Payment - Finalization of the WO and acceptance of deliverables

PSSA forms

Overall PSSA8

Manpower and Price Summary								PSSA8	Issue 3
Subject MELISSA Pilot Plant Operation and Maintenance - Phase 3 (oct 08 to sep 09 : 12 months)	ITT/RFQ:								
National Currency (NC)* : Euro									

Company	UAB	UAB	UAB	UAB	UAB	UAB	UAB		
WP Title	Management	Reassembly of HPC1	Functional validation of HPC1 with Argus Controller	Replacemnt of the Argus Controller by the Schneider PLC	Functional Validation of HPC1 with Schneider PLC Controller	Preliminary culture campaigns in HPC1	HPC1 - conclusions and perspectives		Total WBS-Level
WP Number	96.0	96.1	96.2	96.3	96.4	96.5	96.6		
Labour hours as per PSS A2 (*)	97	506	399	670	918	275	236		2.591
Overall Management	97	25	33	73	33	33	48		263
	0	800	1.600	5.600	1.600	1.600	1.600		9.600 €
Technical Manager	0	237	192	310	363	101	61		1.103
	0	2.952	7.000	17.382	29.460	3.500	0		56.794 €
Engineer	0	0	0	144	370	70	70		514
	0	0	0	5.476	22.200	0	0		27.676 €
Technician	0	244	174	142	151	70	56		711
	0	0	0	0	0	0	0		0 €
1. Total Direct Labour Hours Cost	0 €	3.752 €	8.600 €	28.458 €	53.260 €	5.100 €	1.600 €		94.070 €
2. Internal Special Facilities	0	0	0	0	0	0	0		
3.1-3.4 Material Costs	0	26.000	0	500	0	3.000	0		26.500 €
3.5 High Rel Parts Costs	0	0	0	0	0	0	0		0 €
3.6 External major products Cost	0	0	0	0	4.000	0	0		4.000 €
3.7 External Services Cost	0	54.792	0	10.000	25.000	0	0		89.792 €
3.8 Transport/Insurance Cost	0	0	0	0	0	0	0		0 €
3.9 Travel and Subsistance Cost	1.200	9.253	6.982	3.016	6.311	1.150	700		26.761 €
3.10 Miscellaneous Cost	0	3.001	1.801	1.200	0	0	0		6.002 €
3. Total Other Costs	1.200 €	93.046 €	8.783 €	14.716 €	35.311 €	4.150 €	700 €		153.056 €
4. Subtotal Cost	1.200 €	96.798 €	17.383 €	43.174 €	88.571 €	9.250 €	2.300 €		247.126 €
5.- 7. General expenses	240	17.023	2.621	2.093	6.086	1.001	1.007		28.064 €
8. Total Cost of WPs	2.410	121.016	25.739	49.900	96.729	11.950	6.109		295.793 €
9. Overhead on subcontractors	0	0	0	0	0	0	0		0
10. Subtotal (8+9)	2.410	121.016	25.739	49.900	96.729	11.950	6.109		313.852
11. Profit	0	124	0	543	2.755	0	0		3.423
12. Cost without additional charge	0	0	0	0	0	0	0		0
13. Financial Provision for escalation	97	3.496	1.529	956	439	210	381		7.108
13.1 Contribution to MELiSSA Communication**	15	1.237	263	504	990	112	55		3.176
14. Total (EUROs)	2.522	125.873	27.531	51.904	100.912	12.272	6.545		327.559
15.1 Reduction for companies contribution	970	970	970	970	970	970	970		4.848 €
15.2 Reduction for Spanish national contribution	0	42.420	0	0	25.250	0	0		67.670 €
15.3 Reduction for Catalan government contribution	0	0	0	0	0	0	0		0 €
16. Total Price (EUROs)	1.552	82.483	26.561	50.934	74.693	11.302	5.575		253.101

(*) for PSS A8 of a single company . (**) The EURO is to be used as the NC where the cost accounting system is in EURO

(**) Contribution to MELiSSA communication costs centralized on Prime Contractor

INSTRUCTIONS FOR COMPLETING FORM PSS. A8

The purpose of this form is to obtain the contractor's price calculation on the WBS level as specified in the RFQ/ITT conditions.

The definitions per item number are the same as those given on PSS-A2.

UoG PSSA2

COMPANY PRICE BREAKDOWN FORM — ***Form No. PSS A2*** — ***Issue 4***

Page No. 1 No. of Pages 1

RFQ/ITT No.		COMPANY NAME:	**University of Guelph - CESRF**
Proposal/Tender No.:		Name and Title:	**Dr. Mike Dixon, CESRF**
Economic Condition:	**Euro to Canadian $ Exchange Rate as of July 9, 2008** Type of Price: **Firm Fixed Price**	Signature	
Currency Exchange	**1,59941**	Name and Title:	**Dr. Steven Liss, Vice-President (Research)**
		Signature	

SUPPLIES AND/OR SERVICES TO BE FURNISHED

Research Data and Reports - Food Characterization Trials, Atmospheric management, FPU interface requirement specifications, preliminary design, subsystem definition

LABOUR *Direct Labour cost centres or categories*	Manpower effort *in Manhours*	Gross Hourly Rates *in NC**		National Currency (NC)	Total EURO *€*
1,1 Senior Research Associate, Project Management	462	$25,25		$11.666,14	€ 7.294
1,2				$0,00	€ 0
1,3 Systems Operation Technician	462	$38,16		$17.629,49	€ 11.022
1,4 Project Lead**	122	$88,98		$10.855,56	€ 6.787
1,5				$0,00	€ 0
1,6				$0,00	€ 0
1,7				$0,00	€ 0

Overhead Costing on Labour

Total Net Labour Cost to which University Overhead Charges Apply***		$29.295,63	
University Overhead on Labour	55%	$16.112,60	
Effective Overhead Rate Applied to ESA Cost****	%	12,88	

** Hourly rate of labour cost element 1.4 is not subject to overhead

*** Calculated as the sum of gross labour cost elements 1.1, 1.3

**** Calculated as Net Overhead Charge on Project (Line 7)

1 Total Direct Labour Hours and Cost			*Total Labour $*	***A***	*$40.151,19* / *€ 25.104*

INTERNAL SPECIAL FACILITIES	Type of unit	No. of units	Unit rates in NC			
						€ 0
						€ 0
						€ 0
						€ 0
2 Total Internal Special Facilities Cost				***B***	*$0,00*	*€ 0*

OTHER COST ELEMENTS	Base amounts in NC	OH%	OH amounts in NC			
3.1 Raw materials (Research Materials - Phase A)		0,00	0,00		$0,00	€ 0,00
3.2 Mechanical parts (Prototoype Systems and Analytical)		0,00	0,00		$0,00	€ 0,00
3.3 Semi-finished products		0,00	0,00		$0,00	€ 0,00
3.4 Electrical & electronic components		0,00	0,00		$0,00	€ 0,00
3.5 Hirel parts		0,00	0,00		$0,00	€ 0,00
a) procured by company		0,00	0,00		$0,00	€ 0,00
b) procured by third party		0,00	0,00			
3.6 External Major Products		0,00	0,00		$0,00	€ 0,00
3.7 External Services (consultants)	$20.460,00	0,00	0,00		$20.460,00	€ 12.792,22
3.8 Transport/Insurance		0,00	0,00		$0,00	€ 0,00
3.9 Travels	$27.360,00	0,00	0,00		$27.360,00	€ 17.106,31
3.10 Miscellaneous	$9.600	0,00	0,00		$9.600,00	€ 6.002,21
3 Total Other Direct Cost	*C*		*D*	***E***	*$57.420,00*	€ 35.900,74
4. SUB TOTAL COST			**(A+B+E)**	**F**	**$97.571,19**	**€ 61.004,49**

GENERAL EXPENSES	Cost items to which % applies	Base in NC to which % applies	%			
5. General & Admin. Expenses				G		€ 0,00
6. Research & Develop. Exp.				H	$0,00	€ 0,00
7. Other — Overhead on Labour			12,88	J	$16.112,60	€ 10.074,09
						€ 0,00
8. Total Cost of All Work Packages			***(F+G+H+J)***	***K***	***$113.683,78***	**€ 71.078,57**
9. Overheads on Subcontractors (Base in NC on which % applies:)			0%	L		
10. Sub-total			**(K+L)**	**M**	***$113.683,78***	**€ 71.078,57**
11. Profit (0,00 % on Base Amount in NC:)				N	***0***	
12. Cost without additional charge (to be itemised on Exhibit A)				P	***0***	
13. Financial Provision for escalation, if applicable (justification and details to be stated on Exhibit A)			10,00%	Q	***$11.368,38***	**€ 7.107,86**
14. Total			**(M+N+P+Q)**	**R**	***$125.052,16***	**€ 78.186,43**
15. Reduction for company contribution (if applicable) UoG CESRF overhead return + 1.4				S	***$10.855,56***	**€ 6.787,23**
16. TOTAL PRICE FOR ESA			**(R-S)**	**T**	***$114.196,60***	**€ 71.399,20**

If insufficient space is available to identify all required information, please use additional sheet or insert lines

* The Euro is to be used as the NC where the cost accounting system is in Euro.

UoG PSSA2 Exhibit A

COMPANY PRICE BREAKDOWN FORM		EXHIBIT "A" TO PSS A2		Issue 4 .
			Page No.	1 of 1
RFQ/ITT No.		COMPANY NAME:	University of Guelph - CESRF	
Proposal/Tender No.:		Name and Title:	Dr. Mike Dixon, Director CESRF	
Economic Condition:	Euro to Canadian $ Exchange Rate as of July 9, 2008	Type of Price:	Signature	
Currency Exchange	1,59941	Firm Fixed Price	Name and Title:	Dr. Steven Liss, V.P. Research
SUPPLIES AND/OR SERVICES TO BE FURNISHED			Signature	
Research Data and Reports - Food Characterization Trial, Atmospheric management, FPU interface requirements, onceptual design, subsystem definition				

Cost El. No.	ITEM DESCRIPTION	Purchase Amount Canadian $	Purchase Amount ($)	National Currency Canadian $
	Other Cost Elements			
3,7	Angstrom Engineering cost to reassemble shell components in Spain.	$20.460,00	$20.460,00	$20.460,00
3,9	Travel to MPP; 6 return trips 2 ppl ea. including flights, accomodations, ground transportation each end, meals and subsistence.	$27.360,00	$27.360,00	$27.360,00
3.10	Spare parts, EC & pH probes, return shipping cost of Argus Control system to UoGuelph	$9.600,00	$9.600,00	$9.600,00
				$0,00
				$0,00
			$0,00	$0,00
Total Major Equipment Purchases or Rent		$57.420,00	$57.420,00	$57.420,00
13	Provision for cost escalation is calculated at 10% of the total quoted price. This provision is in place to off-set variable Euro/Canadian Currency Exchange Rates over the life of the project and for inflationary increases in consumables, materials and supplies, internal auditing requirements and salary increases if mandated by the institution.			

UoG PSSA8

Manpower and Price Summary Form no. **PSS A8** Issue 4

Subject: ITT/RFQ:

(*) National Currency (NC): Candian Dollars ($ CDN) (**) Conversion Rate: 1,59941 Economic condition: Firm Fixed Price

COMPANY NAME:	University of Guelph - CESRF
Name and title:	Dr. Mike Dixon, Director CESRF
Signature:	
Name and title:	Dr. Steven Liss, V.P. Research
Signature:	

Company	UoG - CESRF	UoG - CESRF	UoG - CESRF	UoG - CESRF	UoG - CESRF	UoG - CESRF	UoG - CESRF						
WP TITLE	Management	Reassembly of HPC	Functional Validation of HPC1 w/ Argus Controller	Replacement of Argus controller by the Schneider PLC	Functional validation of HPC2 w/ Schneider PLC controller	Preliminary culture campaigns in HPC1	HPC1 conclusions and perspectives						
WP Number	WP 96.0	WP 96.1	WP 96.2	WP 96.3	WP 96.4	WP 96.5	WP 96.6						Total WBS-Level
Labour hours as per PSS A2 (*)													
1.1 - Senior Research Associate	0	185	92	92	0	46	46						462
	0	0	0	0	0	0	0						0
1.3 - Systems Operation Technician	0	139	139	92	46	0	46						462
	0	0	0	0	0	0	0						0
1.5 - Project Lead	17	17	17	17	17	17	17						122
	0	0	0	0	0	0	0						
	0	0	0	0	0	0	0						
Total Labour Hours	17	341	248	202	64	64	110						
1. Total Labour Cost	$1.550,79	$11.506,10	$9.172,87	$7.409,92	$3.313,74	$2.717,41	$4.480,36	$0,00	$0,00	$0,00	$0,00		$40.151,19
2. Internal Special Facilities													$0,00
3.1-3.4 Material Costs	$0,00	$0,00	$0,00	$0,00	$0,00	$0,00	$0,00	$0,00	$0,00	$0,00	$0,00		$0,00
3.5 Hirel Parts Costs													$0,00
3.6 External major products Cost													$0,00
3.7 External Services Cost		$20.460,00											$20.460,00
3.8 Transport/Insurance Cost													$0,00
3.9 Travel and Subsistance Cost		$13.680,00	$8.208,00	$2.736,00	$2.736,00								$27.360,00
3.10 Miscellaneous Cost		$4.800,00	$2.880,00	$1.920,00									$9.600,00
3. Total Other Costs													
4. Subtotal Cost	$0,00	$38.940,00	$11.088,00	$4.656,00	$2.736,00	$0,00	$0,00	$0,00	$0,00	$0,00	$0,00		$57.420,00
5.- 7. General expenses		$5.475,42	$4.192,14	$3.222,52	$969,62	$641,64	$1.611,26						$16.112,60
8. Total Cost of WPs	$1.550,79	$55.921,51	$24.453,01	$15.288,44	$7.019,37	$3.359,05	$6.091,62	$0,00	$0,00	$0,00	$0,00		$113.683,78
9. Overhead on Subcontractors													
10. Subtotal (8+9)	$1.550,79	$55.921,51	$24.453,01	$15.288,44	$7.019,37	$3.359,05	$6.091,62	$0,00	$0,00	$0,00	$0,00		$113.683,78
11. Profit													
12. Cost without additional charge													
13. Financial Provision for escalation (NC)	$155,08	$5.592,15	$2.445,30	$1.528,84	$701,94	$335,90	$609,16						$11.368,38
14. Total NC	$1.705,87	$61.513,66	$26.898,31	$16.817,28	$7.721,30	$3.694,95	$6.700,78	$0,00	$0,00	$0,00	$0,00		$125.052,16
14. Total Euros	€ 1.066,56	€ 38.460,22	€ 16.817,65	€ 10.514,68	€ 4.827,59	€ 2.310,20	€ 4.189,53	€ 0,00	€ 0,00	€ 0,00	€ 0,00		€ 78.186,43
15. Reduction for company contribution NC	-1550,79	-1550,79	-1550,79	-1550,79	-1550,79	-1550,79	-1550,79						-$10.855,56
(if applicable) EUROs	-€ 969,60	-€ 969,60	-€ 969,60	-€ 969,60	-€ 969,60	-€ 969,60	-€ 969,60	€ 0,00	€ 0,00	€ 0,00	€ 0,00		-€ 6.787,23
16. Total Price NC	$1.705,87	$63.064,46	$28.449,10	$18.368,08	$9.272,10	$5.245,74	$8.251,57	$0,00	$0,00	$0,00	$0,00		$114.196,60
16. Total Price Euros	€ 1.066,56	€ 39.429,83	€ 17.787,25	€ 11.484,28	€ 5.797,20	€ 3.279,80	€ 5.159,14	€ 0,00	€ 0,00	€ 0,00	€ 0,00		€ 71.399,20

(*) for PSS A8 of a single company. (**) The EURO is to be used as the NC where the cost accounting system is in EURO

SHERPA PSSA2

COMPANY PRICE BREAKDOWN FORM	***Form No. PSS A2***					*Issue 4*
			Page No.		No. of Pages	
RFQ/ITT No.			COMPANY NAME: **SHERPA ENGINEERING**			
Proposal/Tender No.: **P2653**			Name and Title: **Jean Brunet, Chairman**			
Economic Condition: **2008** Type of Price: **Firm Fixed**			Signature			
			SUPPLIES AND/OR SERVICES TO BE FURNISHED			

LABOUR	Manpower effort	Gross Hourly Rates		National Currency (NC)	Total EURO
Direct Labour cost centres or categories	*in Manhours*	*in NC**			*€*
IP Management & Expertise	**128**	**100,00**			**12.800,00**
IE Engineering	**576**	**87,50**			**50.400,00**
1 Total Direct Labour Hours and Cost			*A*		***63.200,00***

INTERNAL SPECIAL FACILITIES	Type of unit	No. of units	Unit rates in NC			
2 Total Internal Special Facilities Cost				*B*		-

OTHER COST ELEMENTS	Base amounts in NC	OH%	OH amounts in NC			
3.1 Raw materials						
3.2 Mechanical parts						
3.3 Semi-finished products						
3.4 Electrical & electronic components						
3.5 Hirel parts						
a) procured by company						
b) procured by third party						
3.6 External Major Products						
3.7 External Services	**10.000**					10.000,00
3.8 Transport/Insurance						
3.9 Travels	**10.150**					10.150,00
3.10 Miscellaneous						
3 Total Other Direct Cost	*C*		*D*	*E*		*20.150,00*
4. SUB TOTAL COST			**(A+B+E)**	**F**		**83.350,00**

GENERAL EXPENSES	Cost items to which % applies	Base in NC to which % applies	%			
5. General & Admin. Expenses				G		
6. Research & Develop. Exp.				H		
7. Other				J		
(to be specified)						
8. Total Cost of All Work Packages			***(F+G+H+J)***	***K***		***83.350,00***
9. Overheads on Subcontractors (Base in NC on which % applies:)			%	L		
10. Sub-total			**(K+L)**	**M**		**83.350,00**
11. Profit (% on Base Amount in NC:)				N		
12. Cost without additional charge (to be itemised on Exhibit A)				P		
13. Financial Provision for escalation, if applicable (justification and details to be stated on Exhibit A)				Q		
14. Total			**(M+N+P+Q)**	**R**		**83.350,00**
15. Reduction for company contribution (if applicable)				S		
16. TOTAL PRICE FOR ESA			**(R-S)**	**T**		**83.350,00**

If insufficient space is available to identify all required information, please use additional sheet or insert lines

* The Euro is to be used as the NC where the cost accounting system is in Euro.

SHERPA PSSA8

Manpower and Price Summary Form no. **PSS A8** Issue 4

Subject: Installation and operation of HPC1 in the MPP ITT/RFQ:

(*) National Currency (NC) : EURO (**) Conversion Rate: Economic condition: 2008

Company		SHERPA	SHERPA	SHERPA	SHERPA	SHERPA	SHERPA	SHERPA				
WP Title		Management	Ressembly of HPC1	Functional validation of HPC1 with Argus Controller	Replacemnt of the Argus Controller by the Schneider PLC	Functional Validation of HPC1 with Schneider PLC Controller	Preliminary culture campaigns in HPC1	HPC1 - conclusions and perspectives				
WP Number		WP96.0	WP96.1	WP96.2	WP96.3	WP96.4	WP96.5	WP96.6				Total WBS-Level
Labour hours as per PSS A2 (*)		0	24	96	248	264	56	16	0	0	0	704
Management & Expertise		0	8	16	56	16	16	16				128
Engineering		0	16	80	192	248	40	0				576
Total Labour Hours												0
1. Total Labour Cost		0	2200	8600	22400	23300	5100	1600	0	0	0	63200
2. Internal Special Facilities												
3.1-3.4 Material Costs												
3.5 High Rel Parts Costs												
3.6 External major products Cost												
3.7 External Services Cost						10000						10000
3.8 Transport/Insurance Cost												
3.9 Travel and Subsistance Cost		0	700	1850	1150	4600	1150	700				10150
3.10 Miscellaneous Cost												0
3. Total Other Costs		0	700	1850	1150	14600	1150	700	0	0	0	20150
4. Subtotal Cost		0	2900	10450	23550	37900	6250	2300	0	0	0	83350
5.- 7. General expenses												
8. Total Cost of WPs		0	2900	10450	23550	37900	6250	2300	0	0	0	83350
9. Overhead on Subcontractors												
10. Subtotal (8+9)		0	2900	10450	23550	37900	6250	2300	0	0	0	83350
11. Profit												
12. Cost without additional charge		0	2900	10450	23550	37900	6250	2300	0	0	0	83350
13. Financial Provision for escalation	NC											
14. Total	NC											
	EUROs	0	2900	10450	23550	37900	6250	2300	0	0	0	83350
15. Reduction for company contribution	NC											
(if applicable)	EUROs											
16. Total Price	NC											
	EUROs	0	2900	10450	23550	37900	6250	2300	0	0	0	83350

(*) for PSS A8 of a single company. (**) The EURO is to be used as the NC where the cost accounting system is in EURO

NTE PSSA2

COMPANY PRICE BREAKDOWN

FORM No PSSA2 | Page Nr 1 | Issue 4 | Nr of pages 1

ITT/RFQ REF:

COMPANY NAME: NTE
Name and title: F. Gallart
Signature

Proposal/Tender Number: NTE-HPCP2-CF-001 DATE: 07.10.2008

ECONOMIC CONDITION: 2008 Type of price: Firm fixed

SUPPLIES AND/OR SERVICES TO BE FURNISHED

	LABOUR	Manpower effort in manhours	Gross hourly rates in Euro	EURO
	Direct labour cost centres or categories			
	Management / Senior Engineer	102	97,04	9.896
	Engineer II	374	74,00	27.676
	Engineer III	0	60,82	0
	Drawing and Documentation	0	52,66	0
	Manufacturing	0	46,13	0
	Software Development	0	41,02	0
1	**Total direct labour hours and cost**	478		37.574

	INTERNAL SPECIAL FACILITIES	Type of unit	N° of units	Unit rates in Euro	
	1. CLEAN ROOM	HOUR		12,02	0
	2.				0
	3.				0
2	**Total internal special facilities cost**				0

	OTHER COST ELEMENTS	Base amounts in Euro	OH %	OH amounts in Euro	
3.1	Raw materials	0	12%	0	0
3.2	Mechanical parts	0	12%	0	0
3.3	Semi-finished products	0	12%	0	0
3.4	Electrical and electronic components	500	12%	60	560
3.5	Hi-rel parts				
	a) procured company	0	12%	0	0
	b) procured by third party			0	0
3.6	External major products	4.000	12%	480	4.480
3.7	External services	0	12%	0	0
3.8	Transport, insurance	0	12%	0	0
3.9	Travels	150	12%	18	168
3.10	Miscellaneous	0	12%	0	0
3	**Total other direct cost**	4.650		558	5.208
4	**SUBTOTAL COST**				42.782

	GENERAL EXPENSES	Cost items to which % applies	Base in Euro to which % applies	%	
5	General and administrative expenses				0
6	Research and development expenses			5%	0
7	Other				0
8	**TOTAL COST OF ALL WORKPACKAGES**				42.782
9	OVERHEADS ON SUBCONTRACTORS		of		0
10	SUBTOTAL				42.782
11	PROFIT	8%	of	42.782	3.423
12	COST WITHOUT ADDITIONAL CHARGE				
13	FINANCIAL PROVISION FOR ESCALATION				
14	TOTAL				46.205
15	REDUCTION FOR COMPANY CONTRIBUTION				0
16	**TOTAL PRICE FOR ESA**				46.205

NTE PSSA8

N.T.E., S.A.
Can Magi s/n
08186 Lliçà d'Amunt (SPAIN)

PAGE : 1 OF 1
DATE: 07.10.2009
FORM NR. PSSA8 ISSUE 4

MANPOWER AND PRICE SUMMARY

SUBJECT: MELISSA C IVb C8 — ITT/RFQ REF:
NATIONAL CURRENCY: EURO — ECONOMIC CONDITION: 2009

COMPANY	NTE	NTE	NTE	NTE	NTE	NTE	NTE	NTE	NTE	TOTAL
WP TITLE										
WP NUMBER	WP 1	WP 2								
CATEGORY										
Management / Senior Engineer	22	80	0	0	0	0	0	0	0	102
Engineer II	74	300	0	0	0	0	0	0	0	374
Engineer III	0	0	0	0	0	0	0	0	0	0
Drawing and Documentation	0	0	0	0	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0	0	0	0	0
Software Development	0	0	0	0	0	0	0	0	0	0
TOTAL LABOUR HOURS	96	380	0	0	0	0	0	0	0	478
Management / Senior Engineer	2.135	7.763	0	0	0	0	0	0	0	9.898
Engineer II	5.476	22.200	0	0	0	0	0	0	0	27.676
Engineer III	0	0	0	0	0	0	0	0	0	0
Drawing and Documentation	0	0	0	0	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0	0	0	0	0
Software Development	0	0	0	0	0	0	0	0	0	0
TOTAL LABOUR COST	7.611	29.963	0	0	0	0	0	0	0	37.574
INTERNAL SPECIAL FACILITIES										0
RAW MATERIALS										0
MECHANICAL PARTS										0
SEMI-FINISHED PRODUCTS										0
ELECTRICAL & ELECTRONIC COMP.	500									500
HIREL-PARTS COST										0
EXTERNAL MAJOR PRODUCTS COST		4.000								4.000
EXTERNAL SERVICES COST										0
TRANSPORT/INSURANCE COST										0
TRAVEL AND SUBSISTANCE COST		150								150
MISCELLANEOUS COST										0
TOTAL OTHER COSTS	500	4.150	0	0	0	0	0	0	0	4.650
SUBTOTAL COST	8.111	34.113	0	0	0	0	0	0	0	42.224
OVERHEADS ON PROCUREMENTS	60	498	0	0	0	0	0	0	0	558
OTHER	0	0	0	0	0	0	0	0	0	0
GENERAL EXPENSES	60	498	0	0	0	0	0	0	0	558
TOTAL COST OF WPs	8.171	34.611	0	0	0	0	0	0	0	42.782
OVERHEAD ON SUBCONTRACTORS	0	0	0	0	0	0	0	0	0	0
SUB-TOTAL	8.171	34.611	0	0	0	0	0	0	0	42.782
PROFIT	654	2.769	0	0	0	0	0	0	0	3.423
COST WITHOUT ADDIT. CHARGE										0
FINANCIAL PROV. FOR ESCALATION	0	0	0	0	0	0	0	0	0	0
TOTAL	8.825	37.380	0	0	0	0	0	0	0	46.205
REDUCT. FOR COMPANY CONTRIB.										0
TOTAL PRICE IN EURO	8.826	37.380	0	0	0	0	0	0	0	46.206

UAB PSSA2

COMPANY PRICE BREAKDOWN FORM — ***Form No. PSS A2*** — *Issue 4*

Page No. ____ No. of Pages ____

RFQ/ITT No.

COMPANY NAME: **UAB**

Proposal/Tender No.: **MPP-OFR-08-0001**

Name and Title: **Francesc GODIA, Overall Manager**

Economic Condition: **2008** Type of Price: **Firm Fixed**

Signature

SUPPLIES AND/OR SERVICES TO BE FURNISHED

LABOUR	Manpower effort *in Manhours*	Gross Hourly Rates *in NC**		National Currency (NC)	Total EURO €
Direct Labour cost centres or categories					
OM Management & Expertise	**95**	**N / A**			**-**
TM Technical Management	**125**	**N / A**			**-**
EN Engineering	280	N/A			
TN Technician	375	N/A			
All hours of MPP employees paid in Call Off Order 5					
1 Total Direct Labour Hours and Cost			*A*		**-**

INTERNAL SPECIAL FACILITIES	Type of unit	No. of units	Unit rates in NC			
2 Total Internal Special Facilities Cost				*B*		-

OTHER COST ELEMENTS	Base amounts in NC	OH%	OH amounts in NC			
3.1 Raw materials						29000
3.2 Mechanical parts						
3.3 Semi-finished products						
3.4 Electrical & electronic components						
3.5 Hirel parts						
a) procured by company						
b) procured by third party						
3.6 External Major Products						
3.7 External Services						67000
3.8 Transport/Insurance						
3.9 Travels						1200
3.10 Miscellaneous						
3 Total Other Direct Cost	*C*		*D*	*E*		*97.200,00*
4. SUB TOTAL COST			**(A+B+E)**	**F**		**97.200,00**

GENERAL EXPENSES	Cost items to which % applies	Base in NC to which % applies	%			
5. General & Admin. Expenses	0			G		19.440,00
6. Research & Develop. Exp.				H		
7. Other				J		
(to be specified)						
8. Total Cost of All Work Packages			***(F+G+H+J)***	***K***		***116.640,00***
9. Overheads on Subcontractors (Base in NC on which % applies:)			%	L		
10. Sub-total			**(K+L)**	**M**		**116.640,00**
11. Profit (% on Base Amount in NC:)				N		
12. Cost without additional charge (to be itemised on Exhibit A)				P		
13. Communication costs				Q		3.175,95
14. Total			**(M+N+P+Q)**	**R**		**119.815,95**
15. Reduction for Spain contribution (if applicable)				S		67.670,00
16. TOTAL PRICE FOR ESA			**(R-S)**	**T**		**52.145,95**

If insufficient space is available to identify all required information, please use additional sheet or insert lines

* The Euro is to be used as the NC where the cost accounting system is in Euro.

UAB PSSA8

Manpower and Price Summary								PSSA8	Issue 3
Subject HPC1 installation and start-up in the MELISSA Pilot Plant (nov 08 to jul 09 : 8 months)	ITT/RFQ:								
National Currency (NC)* : Euro									

Company	UAB	UAB	UAB	UAB	UAB	UAB	UAB		
WP Title	Management	Reassembly of HPC1	Functional validation of HPC1 with Argus Controller	Replacemnt of the Argus Controller by the Schneider PLC	Functional Validation of HPC1 with Schneider PLC Controller	Preliminary culture campaigns in HPC1	HPC1 - conclusions and perspectives		Total WBS-Level
WP Number	96.0	96.1	96.2	96.3	96.4	96.5	96.6		
Labour hours as per PSS A2 (*)	80	125	55				110		875
Overall Management	80						15		95
	0 €	0 €	0 €	0 €	0 €	0 €	0 €		0 €
Technical Manager		20	20	20	35	15	15		125
	0 €	0 €	0 €	0 €	0 €	0 €	0 €		0 €
Engineer				70	70	70	70		280
	0 €	0 €	0 €	0 €	0 €	0 €	0 €		0 €
Technician	0	105	35	50	105	70	10		375
	0 €	0 €	0 €	0 €	0 €	0 €	0 €		0 €
1. Total Direct Labour Hours Cost	0 €	0 €	0 €	0 €	0 €	0 €	0 €		0 €
2. Internal Special Facilities									
3.1-3.4 Material Costs	0 €	26.000 €	0 €			3.000 €	0 €		29.000 €
3.5 High Rel Parts Costs	0 €	0 €	0 €				0 €		0 €
3.6 External major products Cost	0 €	0 €	0 €				0 €		0 €
3.7 External Services Cost	0 €	42.000 €			25.000 €				67.000 €
3.8 Transport/Insurance Cost	0 €	0 €	0 €				0 €		0 €
3.9 Travel and Subsistance Cost	1.200 €	0 €							1.200 €
3.10 Miscellaneous Cost		0 €	0 €				0 €		0 €
3. Total Other Costs	1.200 €	68.000 €	0 €	0 €	25.000 €	3.000 €	0 €		97.200 €
4. Subtotal Cost	1.200 €	68.000 €	0 €	0 €	25.000 €	3.000 €	0 €		97.200 €
5.- 7. General expenses	240 €	13.600 €	0 €	0 €	5.000 €	600 €	0 €		19.440 €
8. Total Cost of WPs	1.440 €	81.600 €	0 €	0 €	30.000 €	3.600 €	0 €		116.640 €
9. Overhead on subcontractors	0 €	0 €	0 €	0 €	0 €	0 €	0 €		0 €
10. Subtotal (8+9)	1.440 €	81.600 €	0 €	0 €	30.000 €	3.600 €	0 €		116.640 €
11. Profit	0 €	0 €	0 €	0 €	0 €	0 €	0 €		0 €
12. Cost without additional charge	0 €	0 €	0 €	0 €	0 €	0 €	0 €		0 €
13. Financial Provision for escalation	0 €	0 €	0 €	0 €	0 €	0 €	0 €		0 €
13.1 Contribution to MELiSSA Communication**	15 €	1.237 €	263 €	504 €	990 €	112 €	55 €		3.176 €
14. Total (EUROs)	1.455 €	82.837 €	263 €	504 €	30.990 €	3.712 €	55 €		119.816 €
15.1 Reduction for UAB contribution	0 €	0 €	0 €	0 €	0 €	0 €	0 €		0 €
15.2 Reduction for Spanish national contribution	0 €	42.420 €	0 €	0 €	25.250 €	0 €	0 €		67.670 €
15.3 Reduction for Catalan government contribution	0 €	0 €	0 €	0 €		0 €	0 €		0 €
16. Total Price (EUROs)	1.455	40.417	263	504	5.740	3.712	55		52.146

(*) for PSS A8 of a single company . (**) The EURO is to be used as the NC where the cost accounting system is in EURO

(**) Contribution to MELiSSA communication costs centralized on Prime Contractor

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