UNIVERSITY of GUELPH

TECHNICAL NOTE 85.95

Logistics Plan

Prepared by/Préparé par	Theresa Rondeau Vuk
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1.Introduction

This document summarises the overall logistics for the HPC prototype during shipment, reassembly and operations of final acceptance (MPP). This document is based on all HPC Prototype documentation including the logistics of all subsystems.

2.Applicable and Reference documents

2.1. Applicable documents

AD1: HPC Prototype Detailed Design and Verification	TN 85.5
AD2 Prototype Assembly Instructions	TN 85.72
AD3: Prototype Operation Manual	TN 85.91
AD4: Prototype Maintenance Plan	TN 85.92

2.2. Reference documents

RD1: Subsystems Technical Specifications	TN 85.71
RD2: Prototype Interfaces Specifications User Manual	TN 85.73
RD3: Prototype Control System Document	TN 85.74
RD4: Companion CD ROM to	TN 85.71

3.Prototype description

3.1. Prototype system

Refer to TN 85.5

The chamber is designed so as to promote efficient horticultural practice while allowing for change out of technologies should there be a desire for an upgrade. Contact surfaces for the doors will be sealed with Viton gaskets. The end air locks of the chamber are also fitted with glove boxes allowing access into the air lock interior when its external doors are closed. The glove boxes should be positioned on the air lock access door so that the operator may easily reach across the air lock length (0,5 m).

The chamber has two access areas (air-locks) located at each of its ends. One is to be used in the seeding procedure and the other to be used in harvesting the mature plants. This configuration allows for a staged culture strategy and dampens the CO_2 sequestration dynamic associated with canopy development.

The hardware necessary for the operation of the chamber is situated below the growing area and air locks so as to improve space utilization efficiency in the area dedicated to the HPCs within the Pilot Plant facility.

The prototype chamber is divided into five sub-systems (A100 – A500). These include the lighting loft (A100), the liquid sub-system area (A200), the air handling volume (A300), chamber access areas (A400) and the crop growing volume (A500) (Masot, 2004).

3.2. Prototype deliverables items

The Prototype deliverables items are described in the companion CD ROM (equipment database) of TN 85.71.

4.HPC prototype utilisation

Within the constraints of the different appliances standards between Canada and Europe, logistics planning shall optimize the operational availability of the prototype for integration studies.

Prototype Logistics plan summarises the inputs from the prototype subsystems to propose an integrated logistics approach including data such as replaceable items list, resources required for maintenance, spares requirements, identification of re-supply of consumables.

The nominal life-time of the Prototype main subsystems covers operational cycles of 10 years, with the following operational phases:

- Prototype installation in the MELiSSA Pilot Plant (MPP): reassembly of the Prototype and installations within the MPP (i.e. connection of all interfaces)
- Prototype commissioning phase: after installation in the MPP(under a separate contract), the Prototype shall be checked before starting integration studies. This phase is the object of the Acceptance Test related to chamber installation in the MPP and is covered under a separate contract.
- Prototype additional characterisation (TBC)
- Prototype integration operations and studies
- Prototype preventive maintenance
- Prototype corrective maintenance
- Prototype shut-off periods, including shut-off phase, integrity check and re-start (TBC)

5.Maintenance data

5.1. Definitions

The consumables are the element necessary for the integration steps, exchangeable on a regular basis and either discarded or refurbished after use

The Replaceable Items (RI) are items whose replacement is scheduled after items failure

The Shop Replaceable Items (SRI) are items which require to be sent to the initial subcontractor/provider for maintenance or refurbishment.

The Additional Maintenance Items (AMI) are elements to be systematically replaced during exchange of Replaceable Items.
Special Tools are necessary to perform some maintenance activities on the Prototype

5.2. Levels of maintenance

The Prototype maintenance concept is built around two types of activities:

- preventive maintenance: based on checking (hardware inspection, etc…), servicing (e.g. sensor calibration) and replacement of limited life items
- corrective maintenance: based on servicing (cleaning, disinfecting, etc…) and replacement of failed items.

5.3. Replaceable items

The table below lists the Prototype replaceable items:

Sub-system	Component name	Part Number	Manufacturer	Tag (P&ID)
Lighting	HPS bulb	BUL/PHL/600W/SONT	Philips	HPS-Sa HPS-Sb
Lighting	MH bulb	BUL/PHL/400W/HPIT	Philips	MH-SH
Hydroponics	pH Sensor	HI 8614	Hoskin Scientific	pH T-201
Hydroponics	EC Sensor	HI 7638	Hoskin Scientific	C-T201

An exhaustive list of replaceable items can be found in the appendix to TN 85.71 Subsystems Technical Specifications.

5.4. Maintenance task analysis

Refer to TN 85.92 Prototype Maintenance Plan

5.5. Operational and support equipment

5.5.1. List of consumables

There are no consumable hardware items.

5.5.2. List of special tools

No special tools are required for routine operation of the HPC.

5.6. Maintenance plan

Refer to TN 85.92 Prototype Maintenance Plan.

6.Parts analysis

6.1. Shop Replaceable Items

Sub-system	Component name	Part Number	Manufacturer	Tag (P&ID)
Lighting	HPS bulb	BUL/PHL/600W/SONT	Philips	HPS-Sa HPS-Sb
Lighting	MH bulb	BUL/PHL/400W/HPIT	Philips	MH-SH
Hydroponics	pH Sensor	HI 8614	Hoskin Scientific	pH T-201
Hydroponics	EC Sensor	HI 7638	Hoskin Scientific	EC-T201
Hydroponics	Pump	Penta KB Drive	Emerson	GP_4106_01
Hydroponics	Condensate Pump	EG-78183-20	Cole Parmer	GP_4110_01
Air Handling	Blower Motor	Custom	Leeson	BLWR_4111_01
Gas Analysis	Mass Flow Controller	K-32907-67	Cole Parmer	FC_4113_01

6.2. Spare Parts

None

7.Support equipment and facilities

All customized support equipment related to the prototype development will be dismantled and unavailable for future HPC related work in Guelph.

8.Logistics personnel and training

Training activities for the nominal operations, reconfiguration and preventive maintenance will be conducted during the commissioning phase of the Prototype under the next phase of the contract. The training will take place periodically (2-3 week durations) over the installation, commissioning and testing phase of the HPC prototype. Personnel involved will include Dr. Michael Stasiak, Mr. Jamie Lawson and an Argus Control Systems representative (TBD).