TITLE: **SPECIFICATIONS: HRS PIPELINE**

DOC NO: **xxxxASyyyy** **Issue:** A

Compiled by: HRS Pipeline Team

Date:

Approved by: Chris Coetzee
SALT Operations Manager

Date:

VERSION HISTORY

Author	Issue	Date	Change History
DOD	A		Original

ACRONYMS AND ABBREVIATIONS

DEFINITIONS

TABLE OF CONTENTS

VERSION HISTORY **2**

ACRONYMS AND ABBREVIATIONS **2**

DEFINITIONS **2**

TABLE OF CONTENTS **3**

1. INTRODUCTION **4**

1 Introduction

SALT HRS is a facility instrument of SALT. It is a 2-arm, VPH grating cross-dispersed, white pupil echelle spectrograph. The instrument is in a partially evacuated tank and temperature controlled. It has 4 modes: low resolution (R~15000), medium resolution (R~45000) and high resolution (R~70000). The high resolution mode has a so-called “High Stability” option, aimed at accurate radial velocities, where an iodine cell is imprinted on the spectrum and used to provide wavelength calibration. The high stability mode is identical to the high resolution mode except that the fiber from the target is terminated at the iodine cell, then re-imaged onto a second fiber, which goes to the pseudo-slit of the spectrograph.

The input is from 2 fibers, one for the target, and the other either for sky or a reference source (a ThAr source within the instrument, or the SALT facility calibration lamps for flatfields). The medium resolution and high resolution modes are sliced using a classic Bowen-Walraven slicer (producing 3 slices). The low resolution mode is not sliced. There is a red arm and a blue arm (segregated using a dichroic just after the dispersed beam comes to focus when returning from the collimator off-axis paraboloid). There are 2 cameras and the blue and red CCDs are in their own dewars. The CCDs are both single chips (no mosaics).

SALT HRS users need a pipeline so that they are able to reduce their data. This document describes the Specifications for the pipeline.

2 Goals and Objectives

The goal of the SALT HRS pipeline is to provide the SALT user community with software tools to reduce their SALT HRS data. What does the term “reduce” mean?

In its most general form, it means to input a set of science CCD frames, calibration frames and ancillary data into a software package which will output data suitable for analysis by downstream packages: typically determining atmospheric parameters, chemical abundances, and/or radial velocities.
Specific steps envisaged in this process include:

- Perform any raw data basic calibrations needed: e.g. bias subtraction, gain correction, dark correction if needed, flatfielding and accounting for scattered light.
- Trace the orders of both star and sky/reference fibers, including for image sliced data
- Extract the orders accounting for the blaze of the grating

- Wavelength calibrate the orders
- Subtract the sky background from the target (if required)
- Flux calibrate using a standard star (if required)
- Merge the orders to provide a fully reduced spectrum

The pipeline must be able to operate on data from any of the 4 HRS modes: low resolution, medium resolution, high resolution, high stability.