

108050000-TD80005-R02

# Spallation Neutron Source

## Linac Tunnel Smoke Exhaust System Functional System Design (FSD)

February, 2003

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SNS Project Engineer



A U . S . D e p a r t m e n t o f E n e r g y M u l t i l a b o r a t o r y P r o j e c t

SPALLATION NEUTRON SOURCE

Argonne National Laboratory • Brookhaven National Laboratory • Lawrence Berkeley National Laboratory • Los Alamos National Laboratory • Oak Ridge National Laboratory

**Linac Tunnel Smoke Exhaust Controls Description**  
**TD80005 Rev 2, February 18, 2003**

## **Operating Philosophy**

### Purpose:

- 1) Appropriately energize smoke removal fans/dampers, position smoke removal dampers and activate air handlers in response to
  - a) Receipt of a signal from the fire alarm system
  - b) Receipt of signal from PPS system
  - c) Receipt of signal from ODH system
- 2) Provide manual actuation of smoke removal system from the tunnel operating screen
- 3) Provide operator indication that fans/dampers are operating and that dampers are in the proper position.

### Assumptions:

- 1) An ODH override will be implemented via placement of an additional solenoid valve controlled by the ODH system. No software actions are necessary in this system.
- 2) Hard wiring of MCCs will provide damper opening so that the damper opens when the fan is energized and vice versa. No software actions are necessary in this system.

### Operator Controls and Operating Modes

- 1) OFF: All fans de-energized, all dampers closed
- 2) Auto:  
Upon input from Fire Alarm system.
  - a. energize one outside air intake and two smoke exhaust fans/dampers in the tunnel,
  - b. open air intake and exhaust tunnel dampers,
  - c. open outside air intake damper at North wall of Front End buildingUpon input from PPS
  - a. All fans de-energized, all dampers closed (OFF mode)Upon input from ODH system
  - b. energize one outside air intake and two smoke exhaust fans/dampers in the tunnel,
  - c. open air intake and exhaust tunnel dampers,
  - d. open outside air intake damper at North wall of Front End building

## **OPERATOR INTERFACE DEFINITIONS**

### Local Hardware/Manual Operator Controls

- 1) HOA switch for tunnel intake fan/damper (*HS 2201A*)
- 2) HOA switch for tunnel exhaust fan/damper 1 (*HS 2105A*)
- 3) HOA switch for tunnel exhaust fan/damper 2 (*HS 2106A*)

- 4) ON/OFF switch for smoke removal (*HS 2051*)
- 5) ON/OFF switch for smoke removal (*HS 2107B*)
- 6) FAULT indicator light on MCC
- 7) READY indicator light on MCC
- 8) RUN indicator light on MCC

#### Software HMI/EPICS Digital Operator Controls

- 1) Smoke Exhaust Control
  - a. Off
  - b. Auto

#### Software HMI/EPICS Digital Displays

- 1) Status of tunnel intake fan/damper switch (*HS 2201A*)
- 2) Status of tunnel exhaust fan/damper 1 switch (*HS 2105A*)
- 3) Status of tunnel exhaust fan/damper 2 switch (*HS 2106A*)
- 4) Status of north wall damper switch (*HS 2051 or HS2107B*)
- 5) Tunnel intake fan/damper status (*PDS 2201*)
- 6) Tunnel exhaust fan/damper 1 status (*PDS 2105*)
- 7) Tunnel exhaust fan/damper 2 status (*PDS 2106*)
- 8) North wall damper positions (*ZSL 2051, ZSH 2051*)
- 9) Tunnel intake fan damper position (*ZSL 2201, ZSH 2201*)
- 10) Tunnel exhaust fan 1 damper position (*ZSL 2105, ZSH 2105*)
- 11) Tunnel exhaust fan 2 damper position (*ZSL 2106, ZSH 2106*)

#### Software HMI/EPICS Analog Operator Controls

None

#### Software HMI/EPICS Analog Displays

None

#### Software HMI/EPICS Alarms (via EPICS Alarm Handler)

- 1) System not in Auto
- 2) Receipt of fire alarm system signal
- 3) Receipt of PPS system signal
- 4) Receipt of ODH system signal
- 5) HOA switch for tunnel intake fan/damper not in auto
- 6) HOA switch for exhaust fan/damper 1 not in auto
- 7) HOA switch for exhaust fan/damper 2 not in auto

## Control Logic Description

All equipment functions in accordance with the requirements in SNS 10805000-TD80001, Tunnel Operations Functional System Design (the screen for which is repeated below for convenience).

## Screens

