MINOS Elevator Below Ground Foyer ODH Analysis

T962

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(1.0) Introduction

This document presents the Minos Elevator Below Ground Foyer ODH A.alysis for a T962 argon vent pipe that will run through it. Since this foyer is part of the Minos Hall emergency route for fire safety, a number of conservative assumptions will be made in the analysis.

This analysis assumes no ventilation and an inexhaustible supply of argon to the vent pipe. Neither assumption is true. There is a significant amount of ventilation in the elevator foyer that is on diesel powered generator backup. During normal operation the only source of argon in the vent pipe will be a two type K sized compressed gas cylinders with a very small argon bleed into the vent pipe o prevent oxygen from permeating into the pipe.

It is also assumed that any argon leak that develops in the vent pipe will result in a fatality factor of 1.0. In reality the pressure driving argon gas out of any leak will be very small. The pressure vessel engineering note PPD10114 shows that for the worse case the internal pressure in the vent in this foyer will be less than 0.86 psig. The resulting release rate of argon into the foyer will be small as well be small as well.

(2.0) Basic Equipment Failure Rates

FESHM 5064.TA page 3, Table 1, Fermilab Equipment Failure Rate Estimates

```
Pfp  =  1e-9**(1/hr)      (probability of pipe section failure)
Pfw  =  3e-9**(1/hr)      (probability of weld failure)
```

(3.0) Probability of Failed Piping Components

There are no valves on this section of piping. There is 20 ft of pipe in the surface foyer. FESHM 5064 lists failure rates of piping as per section of pipe. Generally pipes come in 20 ft sections.

```
SecArPipe  =  1      (sections of argon piping)
```

All pipe joints are welded. The number of welds on the argon piping system is:

```
NumArWelds  =  12      (number of welds on argon piping)
```

The probability of a piping system failure is:

```
Pfail  =  Pfp*SecArPipe+Pfw*NumArWelds
Pfail  =  0.37e-7**(1/hr)
```

(4.0) ODH Classification

Any argon leak into the foyer is assumed to have a fatality factor of 1.

```
FF  =  1.0**fatalities      (fatality factor with no ventilation)
Phi  =  Pfail*FF
Phi  =  0.37e-7**(fatalities/hr)
ODHclassification(Phi)  =  ODH Class 0
```

The elevator foyer has an ODH 0 classification.

```
FF  =  1.0**fatalities      (fatality factor with no ventilation)
Phi  =  Pfail*FF
Phi  =  0.37e-7**(fatalities/hr)
ODHclassification(Phi)  =  ODH Class 0
```