

Survivor's Guide for Users of the Baseline Validation Test Data

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1 Introduction

1.1 Overview

The Baseline Validation Test Series was conducted in the fall of 1985 at Factory Mutual Research Corp. (FMRC) facilities under Sandia National Laboratories (SNL) direction and under U.S. Nuclear Regulatory Commission (USNRC) sponsorship. For basic information on the test objectives, the construction and layout of the test enclosure, the placement and nature of the test instrumentation, the various fire sources used in testing, and the actual test matrix refer to NUREG/CR-4681. This report represents the single most general reference currently available for this test series. Additional information specific to the last five tests (tests 21-25) is also available in NUREG/CR-4527, Volume 2. Tests 21-25 were all tests performed as a part of the Cabinet Fire Test Program and involve fires (either gas burners or cable fires) within an electrical panel inside the test enclosure. While nominally a part of the cabinet testing program, full data files for these tests are also included in this data release. For reference, viewable versions of these two reports are provided along with the test data files themselves on the public release CD-ROM.

It is not the purpose of this document to repeat the information from the previously published reports. Rather, the purpose of this document is to identify and discuss issues encountered by SNL and other users in accessing and using the test data. These generally relate to issues impacting the integrity, retrieval, and reliability of the gathered data. We refer to this as the "survivors guide" because it provides information not available in published references that is critical to both retrieving and understanding the test data. Any comments regarding this guide are welcomed and we do anticipate periodic updates to reflect the experiences of all users. This version represents the first update to the original Survivor's Guide prepared in June 1991.

1.2 Document Format

The format of this document is quite simple. Section 2 provides a description of the data file structure and the data extraction routine that has been provided. Sections 3 and 4 deal with the identified data issues. Section 3 discusses "common issues" that impact a significant number of the individual tests. Most of the issues identified to date fall into this category. Section 4 identifies any specific issues that have been identified as impacting a particular test. Very few of

these have been identified to date. Note that for a complete picture of any one test, the user must consider both common and test-specific issues. Section 5 provides other bits of information related to the tests and data release. Appendix A provides a listing of the data channel extraction routine FMREADR5. Appendix B provides the common channel map for the main data files.

1.3 What You Got with the CD-ROM

If you are reading this report, then hopefully you also have a CD-ROM that presents the full data and information release for the Baseline Validation Test Series. This CD-ROM contains three general types of information; documentation, support programs, and actual data.

Documentation is provided in the directory DOCUMENT. It includes this document, the original test report (NUREG/CR-4681), and the relevant cabinet fire test report (NUREG/CR-4527, Volume 2). All three are presented in PDF format for viewing by a program such as Adobe Acrobat Reader, but do not allow for editing of the documents.

Also provided are one FORTRAN program, FMREADR, designed to aid the user in the extraction of data from certain of the data files. This program is in the directory PROGRAMS and includes both the source code and an executable version of the program. Operating instructions are provided in Section 2 below.

There are also a number of data files for each test. These include:

- S The primary processed and formatted data report files contain most of the test data after conversion to engineering units. Data is presented in formatted text tables as discussed further below. It is these files that will be the primary source of data for extraction by individual users. The files are located in the directory called "GeneralReport" and each file is named either TEST#RPT.DAT or TST##RPT.DAT where "#" or "##" represents the test number. A program called FMREADR has been provided to assist in the extraction of data from these files (see discussion below).

- S Sphere calorimeter derived data files are also provided on the disc. As noted in NUREG/CR-4681, the test instrumentation included both large and small sphere calorimeters located in matched pairs at various locations within the room. From these instruments it is possible to estimate not only the total heat flux at a given location, but also the relative magnitude of the convective and radiative contributions to the total heat flux and the bulk air velocity at each location. The procedure is described by Newman and Hill.¹ These temperature response data were processed by FMRC to generate these files. The resulting derived data are presented in directory "FluxReport" in the form of formatted data tables in files named HFLUX#.DAT. Note that this data release does not include any specific methods or tools for extracting data from these files.

¹"Assessment of Exposure Fire Hazards to Cable Trays," FMRC, Report No. RC80-T-56, July 1980.

- S Processed fire products collector files are contained in the directory “CollectorReport” with each file named COLL#RPT.DAT or CLL##RPT.DAT. The Fire Products Collector is a large collection hood designed for the measurement of fire properties (calorimetry, gas concentration, smoke density, temperature) for large open fires. As discussed below, caution must be exercised in the interpretation of these data due to the fact that not all of the fire products and exhaust gasses were captured by the collector. Note that this data release does not include any specific methods or tools for extracting data from these files. These files are generally quite small and conducive to hand-transcription of desired data.
- S The raw unformatted general data files are also provided. For most users these files will be of very limited interest. The files contain the scanned data streams prior to formatting and presentation in the final data reports. These files are not generally intended for direct extraction of test data, but rather, were an intermediate product of the testing and data conversion process. They do, however, present some of the basic information on the time and date of each test, the ambient conditions, the fire source size and location, nominal ventilation rates, and a channel map for each test (the map does not change from test to test). Also available in this file is the information on the data conversion polynomials used to convert the raw data to engineering units. These files are primarily of historical interest only, and will likely be of little use to the user. These files are presented in a directory on the disc called “RawGeneral.” Each file is named “RDTEST#.DAT” where “#” corresponds to the test number.
- S The raw unformatted fire products collector data files are contained in a directory named “RawCollector” and each file is named RCTEST#.DAT. The files in “RawCollector” contain simple raw data streams, are not formatted, and will not likely be of interest to most users.
- S Heat release rate (HRR) data files for the cabinet fire tests (21-25) are included in the directory “HeatRelease.” The data was generated by digitizing the heat release plots from NUREG/CR-4527. The directory contains six files. Five of the files are individual ASCII data files with the digitized data for each of the five cabinet fire tests. These files are named “T##HRR.DAT.” The first line in each file indicates the total number of digitized data point sets in the file. The remaining lines each represents a (time,HRR) data pair with time in minutes and HRR in kW. The sixth file, “CabTestHRR.XLS,” is a Microsoft Excel spreadsheet file with all five of the data sets imported into a spreadsheet format (version: Excel 97 SR-1). Also included in the Excel file is a column with the integrated total heat release for each test.

1.4 For More Information Contact ...

Comments regarding the data release and information regarding any data issues that arise are encouraged and welcomed. Courtesy copies of any papers or articles that arise from use of the

test data would also be appreciated. For more information contact: Steve Nowlen, Mail Stop 0748, PO Box 5800, Sandia National Laboratories, Albuquerque, NM, USA, 87185-0748; Phone (505)845-9850; Fax (505)844-3321; e-mail spnowle@sandia.gov

2 Data File Structure and Channel Extraction

2.1 The Extraction Program FMREADR

Provided with the data files is a Fortran program named FMREADR5.FOR and an executable version of this same program named FMREADR5.EXE. This program is designed to extract the full data stream for a user-defined set of channels from the primary data files. It should run on most any fairly modern computer, and has been successfully run in both true DOS mode, and as a DOS window under either Windows 95 or Windows NT. It has been tested on a number of PC platforms including those using 486, Pentium, Pentium II, and Celeron CPUs.

The source code is provided for users who are simply curious, or who wish to customize the program to their specific needs. The program is relatively straightforward and makes use of only simple looping structures. However, the structure of the data files requires that data be extracted in a very specific order of execution. Hence, the looping structure may initially appear somewhat arbitrary. Rest assured, however, that each command has a specific purpose in the context of the data file structure. To the extent possible, a once-through, top-down execution was maintained. Extensive comments are included to help the user understand what is being done at each stage of the program. A listing of the source is included as Appendix A to this document.

The program is a very simple interactive program that asks the user for the name of the input data file to be used, the number of channels to be extracted, and the actual channel number(s) to be extracted. The user is then given an option for either file output or output to screen.

If screen output is selected, the data is simply printed to the screen. If file output is selected, the user is asked to enter the output file name, a file is created, and the data is written to that new file. The first line of the file will specify the total number of scans contained in the file, and the individual channels that were extracted. The rest of the lines will simply specify the time of each scan in the first column, and the corresponding data measurements for each channel in the remaining columns.

Note that once the user knows the sequence of inputs needed to run the program, a simple user response input command file can be set up. One need only create an input file (for example READ.BAT) which contains the individual line by line responses one would normally enter from the keyboard during execution of the program. Running the program with the following command:

```
FMREADR5.EXE <READ.BAT
```

instructs the program to read the user responses from the file READ.BAT rather than seeking keyboard input. This is quite handy for repeated extractions.

The output files are in simple ASCII format with the data stripped of all of the header and footer information of the original data files. The data is output as a simple stream of time/data lines from the first to last scan. A given line represents all of the specified channel measurements for a given time scan.

Note that time in the original data files is expressed in the form 'min:sec'. FMREADR does a conversion of these values and the output file reports time as simple minutes (a decimal value). Times less than zero are pre-fire data, ignition generally occurs at time zero, and positive times represent post-ignition data. The only exception to this is Tests 24 and 25 which used an electrical ignition source (see NUREG/CR-4527, Volume 2 for a description of the time-line for these two tests) so that time of ignition was significantly delayed. In these two tests, time zero is the time that the electrical ignition apparatus was energized.

Also note that the program expects the input data files to have names of a certain form. In particular, the program expects that for Tests 1-9, the fifth character in the file name will be the test number. For Tests 10-25, it expects the fourth and fifth characters in the file name to be the test number. The file name is analyzed to extract the test number. This is critical because it establishes both the total number of scans in the file, and tells the program how many channels are in each file table (13 or 15 as discussed further below). Without this information, the program cannot extract the data. If the program cannot determine the test number, the user will be asked to specify the test number. For more information, see the comments provided in the program listing in Appendix A. It is strongly recommended that the original file names as provided on the data CD be retained by users.

2.2 Overview of the Data File Structure

The full original data files are presented as simple ASCII text files. The files can be opened and viewed with most any text editor, but the user is cautioned that any changes made to the files may render them inaccessible to the provided data extraction routines. Keep in mind that opening a text file with a word processor and then re-saving the file will generally result in various document control characters being inserted into the files. All data is presented in simple engineering units as indicated in the files and in the attached channel list (see Appendix B).

Each file is presented as a series of data tables and sub-tables. Each section of the file represents a printed page from the original data files generated by FMRC with the associated headers and footers on each page. We will refer to each page of the original file as a "sub-table." When we refer to a "table" from the data file, we mean a set of sub-tables or pages that represents the full data stream for a specific set of data channels. Depending on the total number of scans, a single data table may contain several sub-tables (pages).

The table structure in each file follows a well defined and consistent pattern. Note, however, that there are two distinct patterns, one characteristic of the early tests (Tests 1-15) and one characteristic of the later tests (Tests 16-25). So long as you use the provided channel extraction

program, FMREADR, explicit knowledge of the internal file structure is not needed. However, if you wish to devise your own data extraction routines, or modify the provided routine, then you will need to understand the file structure. The general characteristics of the files are as follows:

- S** The files are made up of formatted ASCII character tables where each table presents the test data for a given set of channels. Each table is in turn divided into sub-tables with each sub-table representing a printed page of data in the original data files. The sub-table structure is discussed further below.
- S** The number of channels presented in each table is generally 13 for Tests 1-15, and 15 for Tests 16-25. That is, the first table in the file for Test 1 would cover channels 1-13, the second table would represent channels 14-26, and so on. The one exception to this rule is the final table where there are not a full set of channels left to present. In this final table the remaining channels are presented. Since there are a total of 306 channels in each data file, the final table for Tests 1-15 will hold 7 channels, and for Tests 15-25, the final table holds 6 channels.
- S** The total number of time/data scans is different for each test. The following table provides the full scan count for each test. Note that as discussed in Section 3.1 below, some tests recorded two “time zero” scans. The scan count presented here is the full scan count (it includes both of the “time zero” scans for the tests impacted by this issue).

Total number of Time/Data scans for each test.												
Test:	1	2	3	4	5	6	7	8	9	10	11	12
Scans:	198	279	139	280	197	233	219	254	255	230	308	224
13	14	15	16	17	18	19	20	21	22	23	24	25
224	266	362	242	374	278	218	170	386	326	541	721	685

- S** The data table for each channel set (e.g., channels 1-13) is subdivided into a number of sub-tables. Each sub-table represents a printed page in the original data files. Each page presents up to 40 time/data scans for the given set of channels. Thus, the number of sub-tables in each table will depend on the total number of scans. Full pages of 40 scans are presented until one of two criteria are reached:
 - S** If the total number of time/data scans is less than 380, then the last sub-table will simply pick up whatever scans are left after having filled as many full 40-scan pages as possible. This applies to Tests 1-20 and Test 22.
 - S** If the total number of time/data scans is greater than 380, then the data tables have been split. This split was simply an artifact of the FMRC data recording system but does complicate the extraction process. The first 380 scans for all channel sets

are presented in tables at the top of the file, and any remaining scans are presented separately in similar tables at the end of the file. This applies to Tests 21 and 23-25. To clarify, at the top of the file each table will cover 15 channels, and will have 9 sub-tables of 40 scans each, plus a single sub-table of 20 scans for a total of 380 scans. This will be repeated for each group of 15 channels. Only after the first 380 scans are reported for all channels does the file return to the first set of channels (1-15) and present the remaining time/data scans until all data is presented. The format of this second section follows the same pattern with sub-tables of 40 scans and a final sub-table that picks up any remaining scans after as many full pages as possible of 40 scans each have been filled.

- S At the end of each table representing a set of 13 or 15 channels, that is, after all of the individual time/data scans have been presented, the files also present the maximum value recorded on each channel and the time that value was recorded.
- S The table and sub-table structure is consistent for each of the 25 data files. The sequence of blank, header and data entry lines always follows a consistent pattern. The pattern can be discerned by careful examination of the extraction routine FMREADR, but is too complex to describe in simple terms here. The program FMREADR simply keeps track of where it is in a given data file by counting the number of read statements made so far (recall that each READ advances the file pointer by one line). The program thereby knows whether the next line in the file is needed as data, is simply a header/footer line with no useful information, or contains a list of channel numbers that may need to be deciphered. That is, certain of the header lines in each table contain the channel numbers for the current table. As each table is encountered, the channel numbers are deciphered and compared to the desired channel numbers to see if that table contains desired data. If it does, then the data is extracted from each data line in the table. If a line contains desired data, the line is read in and the desired channel values extracted for later output. Otherwise, a “dummy” READ simply by-passes and counts those lines that do not contain useful information.

3 Common Issues

3.1 Time Zero Double Logging

This issue impacts tests 1, 6, 8, 14-17, and 20-22. Tests 2-5, 7, 9-13, 18, and 23-25 are not impacted. During the course of logging ten of the tests, for an unknown reason two data streams for time zero were recorded. This can disrupt data processing programs if the user is calculating the time between data scans or if a data channel's time rate of change (differential) is being estimated. In other circumstances, this issue should cause no problems.

It would appear that the data logging logic effectively logged a time "minus zero" and a time "plus zero". The actual fires should be considered to have been ignited coincident with the second logged time zero data set in the impacted cases. As a general rule, data was recorded at five second intervals, hence, the maximum offset resulting from this practice would be five seconds, a very small time interval in the context of these tests. At most, this introduces an uncertainty of about 5 seconds in the actual time of ignition for the impacted tests.

For normal data plotting no actions are required to actively address this issue. However, if the user is calculating time intervals between data scans for the purposes of estimating the rate of change of a data channel reading, then it is recommended that the first of the two zero time scans be discarded. This must be done manually or by user software because the SNL supplied programs do not currently address this issue.

As a warning to the user, the raw data files retain both time zero scans for the impacted tests. Any attempts to remove these scans from the original data files will render the files inaccessible to the SNL data extraction routines because this would disrupt the very well-defined file structure that allows the extraction routine to work.

3.2 Ventilation Issues

There are ventilation issues that impact, to varying degrees, each of the 25 tests run in this test series. These issues are discussed below and include accuracy of the nominal ventilation rates cited in the test reports, leakage from the enclosure during testing, problems with some of the ventilation flow rate instrumentation in some tests, and interpretation of data from the fire products collector.

3.2.1 Nominal Ventilation Rates

This issue impacts each of the 25 tests run. In the test matrix of NUREG/CR-4681 the nominal ventilation rate of the test enclosure during each test is identified and ranged from 1 to 10 Air Changes per Hour (ACH). However, these values are only the nominal ventilation rates and should be viewed as rough estimates only. The difference between nominal and actual ventilation rates appears to be as high as 20% based on the tests examined to date. For example, in Test 1

the nominal ventilation rate is cited as 10 ACH whereas the actual ventilation rate was approximately 12.5 ACH. The actual ventilation rate in each test was measured and is reported. The measured values should be used whenever possible in lieu of the nominal ventilation rate values. In particular, the measure inlet flow rate is considered the most reliable indication of the actual ventilation flow (this is discussed further in Section 3.2.2).

3.2.2 Leakage

This issue impacts each of the 25 tests run. During testing significant leakage of air from the test enclosure was noted. The ventilation system design pumped air into the room resulting in a room pressure slightly higher than ambient (the pressure in the room is measured and reported). Due to this positive pressure, there was leakage from the room during testing. The outlet ventilation rate measured and reported in the data files only reflects flow through the exhaust duct. Any leakage from the room would bypass this duct and would not be measured. For this reason, the measured outlet ventilation rates will typically be lower than the measured inlet ventilation rate. It would appear that the typical outlet duct flow was only about 70-80% of the inlet flow implying significant leakage.

During testing leakage did occur, in particular, around the double doors that provided access to the room (the doors were closed during testing, but leakage around the edges of each door was noted), from the corners of the room where the walls met, at the wall-to-floor interface, and along the wall-to-ceiling interface. In some cases leakage was also observed around the edges of the inlet ventilation ducts which penetrated through the ceiling of the test enclosure in six locations.

For this reason the reported inlet ventilation rate is considered a more reliable indication of actual enclosure ventilation rates than is the reported outlet ventilation rate. It was thought that the rate of leakage might be easily estimated as a constant fraction of the inlet or outlet flow, or as a simple function of the room pressure. Hence, some efforts were undertaken to determine if the ratio of the outlet to inlet ventilation flow was constant, or perhaps a simple function of the room pressure. These efforts showed no consistency in either the outlet/inlet ratio, nor could a clear relationship between pressure and leakage be established. Two possible explanations for this are (1) that the doorway leakage varied from test to test, and/or (2) the leakage from around the ventilation inlet ports was not consistent from test to test.

If an estimate of the total outflow rate is needed, it is recommended that a full mass balance on the room be performed. This is not especially difficult given modern computing capabilities. The mass outlet flow rate can be estimated based on the difference between the mass inlet flow rate and rate of change of mass in the room. The room “storage” term can be estimated using the measured internal room temperatures at various locations. A fixed room volume is assigned to each measurement probe, and the mass of air at each time step can be estimated based on simple $PV=mRT$ relations. SNL has utilized successfully this approach in various analyses.

3.2.3 General Reliability of Exhaust Gas Venting Rate Data

This issue impacts Tests 4, 6-8, 14-16, and 18-25. Tests 1-3, 5, 9-13, and 17 appear unaffected. In several of the tests, the data stream for the outlet flow rate (channel 199) is obviously in error. In these tests, the outlet ventilation rate was recorded as higher than the inlet rate, a condition that would not be expected except for a limited time under severed fire conditions (when there was a high rate of volumetric expansion active). In general, the outlet ventilation rate follows the anticipated trend of the ventilation system, but the magnitude of the readings appears far too high.

The inlet ventilation rates are considered more reliable and less susceptible to error than the outlet ventilation rate. This is because the nominal ventilation rate was verified during the pre-ignition stage using an independent instrument (not a recording instrument, indication only). Further, the inlet air stream was clean ambient air. In contrast, the exhaust stream ventilation rate was not verified, and the exhaust stream was made up of smoke laden air.

The ventilation duct velocity was measured at both the inlet and outlet based on the differential pressure across a orifice plate in each the duct. In the case of the exhaust gas stream, it is likely that one or both of the tubes leading to the differential pressure gauge may have been blocked either by soot or by pinching or may have become disconnected. In some few cases it does appear that both the inlet and outlet ventilation rate data suffered failure during testing. This is discussed further below as it impacts specific tests.

3.2.4 The Fire Products Collector Data

This issue impacts all 25 tests. The FMRC test facility includes a very large fire products collector hood that is used routinely in open burn tests to provide calorimetry and fire products characterization (gas concentrations, temperature, smoke density, etc.). In these tests, the enclosure ventilation exhaust duct was routed to the fire products collector, and data from the collector was routinely logged. Caution must be exercised in using the collector data. Issues impacting the data include:

- S** The enclosure exhaust gas represents only a very small fraction of the total flow through the fire products collector. The exhaust gas stream was diluted significantly by air drawn into the collector from the general enclosure. Hence, the actual gas concentration values, smoke density, and temperature data all represent a mixture of ambient and enclosure gas streams.
- S** Due mostly to the very large volume of the test enclosure, there is a significant lag time between the fire behaviors within the room and sensing of the associated effects at the fire products collector.

- S** Not all of the fire products from the test fires were actually collected. As discussed in Section 3.2.2 above, there was significant leakage of air from the room during testing so that a significant fraction of the total fire products by-passed the collector. The leakage flow would not be captured by the fire products collector.

Also note that no specific methods or tools for extracting data from these collector data files have been provided by SNL. However, each of these files is quite small and contains a very limited amount of data. These files are in the directory COLLECTR, and data from these files can be readily extracted manually.

3.3 Enclosure Surface Heat Flux Data

This issue impacts each of the 25 tests. Included in the test instrumentation were a number of surface heat flux gauges mounted on the walls and ceiling of the enclosure. It is clear that the data from all of the surface heat flux probes as reported in the main data reports is in error. This problem came to light when we attempted to use this data to estimate the relative amount of heat being absorbed by the surfaces. All of the heat flux gauges indicate virtually zero heat flux to the walls. It would appear that this was a problem that occurred when the raw test data was converted to engineering units. It may be possible to recover the lost data from the original raw data files, although no such attempts have yet been made. All of the enclosure surface heat flux data should be considered unreliable.

Note that this does not impact the surface temperature response data. Indeed, local heat fluxes for the enclosure walls have been successfully estimated based on the surface response using a simple one-dimensional finite difference model to approximate the transient heat conduction behavior.

3.5 Wall Properties

This “issue” impacts all 25 tests. This discussion is not an “issue” in the same sense of other issues identified herein, but rather, is intended to convey SNL’s experience with the analysis of wall/ceiling response and the implications for the material properties that one might wish to assume for the enclosure surfaces.

The walls and ceiling of the test enclosure were constructed of 1-inch (2.54 cm) thick Marinite panels. Marinite is a calcium-silicate mineral board material manufactured by Manville. The manufacturer reports a nominal density of 737 kg/m³ and reports nominal material properties for thermal conductivity and specific heat that are functions of temperature as documented in the table below. However, when attempts were made to model the wall temperature response the results of the analysis using the nominal material properties were less than satisfactory.

In particular, a one-dimensional finite difference model was implemented by SNL. The internal surface was modeled as a known temperature boundary condition driven by the measured test

data. The outer surface was modeled as insulated (no heat loss). The results were validated by comparison of the predicted and measured outside surface temperature for several locations with matched inner/outer surface temperature data pairs. Use of the nominal material properties resulted in outside surface temperature response predictions that were uniformly and substantially lower than the measured response. Nominally, this would be indicative of a thermal conductivity higher than reported by the manufacturer, but some explanation for this behavior was sought.

Nominal Marinite Material Properties as Reported by the Manufacturer, and SNL curve fits assuming linear behavior with temperature.					
	Thermal Conductivity			Specific Heat	
	T (EK)	k (W/mEK)		T (K)	C _p (J/kgEK)
	450	0.117		366	1172
	477	0.118		477	1255
	533	0.121		589	1339
	589	0.125		700	1423
	645	0.130			
	700	0.136			
	SNL Fits:	k=0.0819+(7.525E-5)T _K		C _p =897+(0.751)T _K	

Ultimately, it was found that the manufacturer does cite a range of material density values of 700 to 1000 kg/m³ in the associated Material Safety Data Sheet (MSDS). The originally assumed value of 737 kg/m³ was found to be just a nominal value reported in manufacturer sales literature. Hence, SNL chose to “experiment” with the assumed property values to obtain a better fit between the predictions and the data.

In general, the specific heat of a material is largely unaffected by density being a mass-related property. Hence, SNL assumed that the nominal specific heat values remained valid. Using the curve fit, a value of 1.16 kJ/kgEK was assumed as a nominal room-temperature specific heat value.

However, thermal conductivity is known to vary with material density with a higher density material having higher thermal conductivity than a lower density version of the same material. Hence, to explore the impact of material properties, SNL assumed that the panels used in construction were at the upper end of the manufacturers density range. Hence, a density of 1000 kg/m³ was assumed.

In the transient thermal model the thermal parameter of interest is actually the thermal diffusivity. This parameter was adjusted to obtain the best possible fit between predictions and data for a number of locations in several tests. The best results were obtained assuming a thermal diffusivity of $2.0\text{E-}7 \text{ m}^2/\text{s}$. These results were, indeed, quite good with the predictions and data matching quite well over a range of test conditions and locations. Assuming the above stated specific heat and density values, this implies a thermal conductivity of approximately 0.23 W/m EK .

Hence, it is SNL's recommendation that for the analysis of the test enclosure walls and ceiling, the following material properties be assumed:

Thickness = 2.54 cm (1 in.)
Thermal Conductivity = 0.23 W/m EK
Specific Heat = 1.16 kJ/kg EK
Density = 1000 kg/m^3
Thermal Diffusivity = $2.0 \times 10^{-7} \text{ m}^2/\text{s}$

The floor of the test enclosure was the concrete floor slab of the FMRC test facility. SNL has no specific information regarding the thermal properties of the floor.

4 Test Specific Data Issues

4.1 Test 1

No test specific issues have been identified for Test 1. It might be noted, however, the Tests 1 and 2 are virtually identical in setup. The only significant difference is a slightly higher ventilation rate in Test 1 (about 12.5 ACH) as compared to Test 2 (about 10 ACH).

4.2 Test 2

No test specific issues have been identified for Test 2. See note in Section 4.1 regarding similarity of Tests 1 and 2.

4.3 Test 3

4.3.1 Wall Integrity Breached

Test 3 involved a 2 MW fire with a high ventilation rate (10 air changes per hour). During the course of this test the high ventilation rate combined with the heat-induced expansion of air in the room acted to significantly pressurize the test enclosure. At approximately 5 minutes into the test, one entire wall of the test enclosure shifted at the wall/floor interface. This opened a small gap in the lower portions of two of the four room corners. This appeared to have relatively little impact on the fire or on the room environment but did act to relieve the pressure buildup within the room. It was due to this experience that subsequent tests involving fires of significant size were performed at no more than 8 room air changes per hour (ACH) ventilation rates.

4.4 Test 4

No test specific issues have been identified for Test 4.

4.5 Test 5

No test specific issues have been identified for Test 5.

4.6 Test 6

No test specific issues have been identified for Test 6.

4.7 Test 7

No test specific issues have been identified for Test 7.

4.8 Test 8

No test specific issues have been identified for Test 8.

4.9 Test 9

No test specific issues have been identified for Test 9.

4.10 Test 10

No test specific issues have been identified for Test 10.

4.11 Test 11

No test specific issues have been identified for Test 11.

4.12 Test 12

No test specific issues have been identified for Test 12.

4.13 Test 13

No test specific issues have been identified for Test 13.

4.14 Test 14

No test specific issues have been identified for Test 14.

4.15 Test 15

No test specific issues have been identified for Test 15.

4.16 Test 16

No test specific issues have been identified for Test 16.

4.17 Test 17

No test specific issues have been identified for Test 17.

4.18 Test 18

No test specific issues have been identified for Test 18.

4.19 Test 19

No test specific issues have been identified for Test 19.

4.20 Test 20

No test specific issues have been identified for Test 20.

4.21 Test 21

4.21.1 Heat Release Rate

The test fire was intended to follow a prescribed transient profile as discussed in NUREG/CR-4527, V2 and in NUREG/CR-4681. However, it became apparent after initial processing of the test data, that the fire peak intensity was not maintained for the full test period. This was later attributed to initial depletion of the gas supply tanks and to icing of the control valves. A plot of the actual versus intended heat release rate profile for this fire is available in NUREG/CR-4527, V2. Digitized time/HRR data pairs were generated by SNL based on the actual fire HRR profile and have been provided through data files on the CDROM in the directory "HeatRelease."

4.22 Test 22

4.22.1 Fire Heat Release Rate

During Test 22 it had been intended that the propylene burner would be maintained at the full intended intensity of 1 MW for several minutes after the initial six minute transient period. However, due to problems with the gas supply, this could not be accomplished. In fact, after reaching peak intensity, the fire immediately began to decrease in intensity. This was caused by low fuel level in the fuel tanks and by icing in the fuel control valves.

SNL has calculated the actual fire heat release rate based on oxygen consumption calorimetry using a method discussed in NUREG/CR-4681. The actual fire HRR profile has been presented in NUREG/CR-4527, V2. The actual HRR profile has since been digitized. The CDROM includes data files with the time/HRR data pairs from digitizing of the actual test profile (see directory HeatRelease on the CDROM).

4.23 Test 23

4.23.1 Heat Release Rate and Ignition Time

Test 23 was an uncontrolled cable fire. A plot of the actual heat release rate profile for this fire is available in NUREG/CR-4527, V2. Digitized time/HRR data pairs were generated by SNL from

these original plots and have been provided through data files on the CDROM in the directory "HeatRelease." Test 23 was ignited by a simulated transient fire source at 'time zero'.

4.24 Test 24

4.24.1 Heat Release Rate

Test 24 was an uncontrolled cable fire. A plot of the heat release rate profile for this fire is available in NUREG/CR-4527, V2. Digitized time/HRR data pairs were generated by SNL from these original plots and have been provided through data files on the CDROM in the directory "HeatRelease."

4.24.2 Ignition Time

Test 24 involved a simulated high resistance terminal connection as the ignition source. This electrical ignition apparatus was first energized at 'time zero' as recorded in the data files. The first wisps of smoke were noted by an observer viewing the panel with binoculars from outside the test enclosure at 10:30 (min:sec). The first open flaming was observed at 15:20. Hence, the time of actual ignition is 15:20 as recorded in the data files. In this test, the initial fire started by the electrical source was quite weak and grew more slowly than had been observed in other similar tests by SNL. The fire began to spread significantly about 4 minutes after the first open flaming was observed. Significant heat release was not observed until approximately 20 minutes.

4.24.3 Problems with Ventilation Data

In tests 24 and 25 (the last two tests in the series) it is apparent that the ventilation system flow rate measurement probes suffered some form of failure. From the behavior of the data, it would appear that the signal wires were subject to intermittent shorting problems. This is especially obvious in the data from Test 24, but may also have compromised the data from Test 25 as well (see discussion below). The inlet duct probe in Test 24 shows far more inconsistent behavior than had been observed in earlier tests. The data fluctuates much more widely than had been observed in earlier tests.

Inspection of the pressure probes used to measure the ventilation rate after the test series was completed showed that the pressure probes themselves were still operational and within the manufacturer specified calibration range. Hence, it is suspected that the power/signal wires suffered either mechanical or thermal damage prior to this test. These wires were rather long and did pass up over the top of the test enclosure. Damage may have led to an intermittent shorting problem.

Note that in Test 24 there is a prolonged pre-ignition period due to the use of the electrical ignition source in this cabinet fire test. Examination of the data appears to show an inlet ventilation rate averaging about 2 Air Changes per Hour (ACH). This is slightly above the

nominal set ventilation rate of 1 ACH. Most tests did run with a ventilation rate slightly higher than the nominal desired value. Also, the fluctuations in the data were generally more pronounced at lower ventilation rates than they were at higher rates, an artifact of the pressure probes used in testing. Hence, the nominal average inlet ventilation rate for this test may be accurate, but should be viewed with some scepticism. The outlet ventilation rate data is clearly bad.

For general purposes, it is recommended that an inlet ventilation rate of approximately 2 ACH be assumed for this test. This value must be considered uncertain, however. The likely range of uncertainty might place the actual value somewhere between 1.5 and 2.5 ACH.

4.25 Test 25

4.25.1 Heat Release Rate

Test 25 was an uncontrolled cable fire. A plot of the heat release rate profile for this fire is available in NUREG/CR-4527, V2. Digitized time/HRR data pairs were generated by SNL from these original plots and have been provided through data files on the CDROM in the directory "HeatRelease."

4.25.2 Ignition Time

As with Test 24, Test 25 involved an electrical ignition source. The actual time of fire ignition was approximately 16 minutes as recorded in the data files. Significant heat release was not observed until approximately 17 minutes.

4.25.2 Problems with Ventilation Data

As noted in Section 4.24.1 above, it would appear that the ventilation rate data probes in Test 24 suffered some type of failure, possibly a failure in the power/signal lead wires. Hence, the ventilation rate data in Test 25 is also highly suspect. The desired ventilation rate during this test was 8 ACH. The ventilation data appear to indicate ventilation rates of about 15-20 ACH.

Because of the other problems with the ventilation rate data that were experienced, one must consider these data suspect for Test 25. However, it is interesting to note that the inlet and outlet probes are cross-consistent with each other. That is, in certain other tests it is obvious that the outlet data was bad, whereas the inlet data was as expected. In Test 25 both the inlet and outlet data are in the 15-20 ACH range, the two values appear to track major fluctuations consistently, and the inlet rate is consistently above the outlet rate as one should expect (due to leakage). However, the indicated rate is approximately twice the desired nominal ventilation rate of 8 ACH called for in the test plan. Hence, the actual ventilation rate was during Test 25 must be considered uncertain.

It can be safely concluded that the ventilation rate was at least 8 ACH given that the ventilation system was set manually prior to the test. Indeed, because most tests ran slightly higher than the desired nominal rates, it is safe to assume the actual ventilation rate may have been as high as 10 ACH. Given the consistency of the inlet and outlet data, one cannot fully dismiss the possibility that the ventilation rate was indeed greater than 15 ACH. This, however, is considered unlikely given the other problems that were encountered in the ventilation data. SNLs recommendation is to assume a ventilation rate for Test 25 of 8-10 ACH.

5 Other Information of Importance

The information contained in this data release is fully public. Neither SNL nor the USNRC nor FMRC has any proprietary interest in the data. All information contained in this release is unclassified and is categorized as “General Technical Data - Available” (GTDA) per U.S. export control laws and requirements.

Distribution of the data is currently made free of charge to any interested party. Any party wishing access to the data should contact SNL as indicated in Section 1 above. It is preferred that users obtain the data directly from SNL as it is our intent to keep track of data users informally so that updates to this document can be distributed to all interested parties. However, this is not by any means a legal requirement, simply a request.

Users are asked to appropriately acknowledge the source of the data when it is used in support of other published works. An appropriate citation of NUREG/CR-4681 will serve this purpose.²

Users are also asked to provide courtesy copies of any publications (to the contact cited in Section 1 above) that make significant use of the data contained in this release. Again, this is by no means a requirement, simply a request. As the original authors of the study, we have a natural curiosity to follow works that derive from this effort.

Any new issues identified by users should be communicated to SNL as indicated in Section 1 above. These will be communicated to other users, and as appropriate, updates to this document may be generated to cover these issues.

²Citation as follows: S. P. Nowlen, *Enclosure Environment Characterization Testing for the Base Line Validation of Computer Fire Simulation Codes*, NUREG/CR-4681, SAND86-1296, Sandia National Laboratories, Albuquerque, New Mexico, USA, March, 1987.

6. Acknowledgments

As noted in NUREG/CR-4681, the tests at FMRC were executed by the outstanding FMRC staff in particular including Jeff Newman and John Hill. I again thank FMRC for their help in the performance of these tests. Since that time there have been many individuals who have been supportive of SNL's efforts to follow through with full public release of the test data. In particular, the author acknowledges the contribution of Prof. Fred Mowrer of the University of Maryland and his long-standing support of our efforts in this regard. In addition to his overall support, Fred worked with us in the earlier partial data release of Tests 3, 5 and 21 in 1991, and also acted as our "guinea pig" testing out the data extraction routines. Fred has been a long-term advocate of full public release of the data, and for this we thank him. Finally, we thank both Nathan Siu and H. W. 'Roy' Woods of the USNRC for their support of our efforts to release this data set. The work involved was non-trivial, and Nathan and Roy provided the direct support needed to finalize this release.

Appendix B: Program Listing for FMREADR5.FOR

```
PROGRAM FMREADR5
  INTEGER MIN,SEC,CHANS(15),ECHANS(50),SCANS,NCHANS
1  ,FLAG(15),SFL(8),SCANFIL(25),NTOT,NBLKFIL(25)
2  ,SECOND
  REAL DATA(50,750),TIME(750),DUM1
  CHARACTER*40 FNAME
  CHARACTER*10 ALPHA,SIGN
  CHARACTER*8 DUMMY(15)

C
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C
C      Revision history:
C
C      Revision 0: 1985 - original program developed in conjunction
C      with the test program to support extraction of the data
C      from the FMRC data files. The original program was
C      written for use on a VAX mainframe computer system with
C      the data files read from ANSI format 9-track tapes.
C
C      Revision 1: August 5, 1998 - program rewritten to
C      compile on PC / FORTRAN 90 platform -
C      This required some restructuring of the program
C      read and write statements and the file open statement.
C      Some simplification of file specification setup also.
C
C      Revision 2: August 6, 1998: added scan count for test 13
C
C      Revisions 3-5: Sept.1998-Feb.1999: during this time, the program
C      was refined and revised a number of times in anticipation of
C      the first full public release of the data, and potential
C      wide-spread use of the program. Attempts were made to
address      various user-interface and platform issues. The file
structure    information was expanded to include scan counts for all of
the          fire tests. We also worked on refinement of output structure
C          and output formatting issues, generally cleaned up the code,
C          and tested it against all files. Version 5 is the version
C          distributed with the first official release of the full set
C          of data files.
C
C      THIS ROUTINE IS INTENDED FOR USE
C      IN THE EXTRACTION OF PARTICULAR DATA CHANNELS
C      FROM GENERAL BASE LINE VALIDATION ENCLOSURE FIRE
C      TEST DATA FILES. THESE FILES WILL
C      HAVE NAMES SUCH AS "TEST1RPT.DAT" AND HOLD
C      THE DATA IN BLOCKS OF (GENERALLY) 13 CHANNELS.
```

```

C           THESE LARGER DATA BLOCK ARE FURTHER DIVIDED INTO
C           SUBBLOCKS OF 40 (LESS FOR LAST SUB BLOCK) SCANS EACH.
C
C           NOTE: DEFAULT PROGRAM SPECIFICATIONS ASSUME
C           THAT THE DATA FILE WILL BE NAMED "TEST#RPT.DAT"
C           OR "TST##RPT.DAT". AS LONG AS A NAME OF THIS FORM
C           IS USED, THE ROUTINE WILL FIGURE OUT WHICH TEST
C           IS BEING EVALUATED, AND WILL, GENERALLY, HAVE
C           AVAILABLE THE INFORMATION NEEDED TO EXTRACT DATA
C           CHANNELS.
C
C           THIS ROUTINE IS DESIGNED TO BE AN INTERACTIVE
C           PROCEDURE WITH USER KEYBOARD INPUT REQUESTED AS
C           NEEDED. AN OUTPUT FILE WITH A NAME SPECIFIED BY
C           THE USER WILL BE GENERATED IN THE CURRENT DIRECTORY.
C
C           FILE FORMAT SPECIFICATION INFORMATION IS CONTAINED
C           IN TWO DATA STRINGS AS FOLLOWS:
C           SCANFIL = TOTAL NUMBER OF TIME/DATA SCANS FOR EACH TEST
C           DATA SCANFIL/198,279,139,280,197,233,219,254,255,230
C           1 ,308,224,224,266,362,242,374,278,218,170
C           2 ,386,326,541,721,685/
C           NBLKFIL = NUMBER OF CHANNELS IN EACH BLOCK; either 13 or 15.
C           Recall that the files are basically pages and pages of
C           data in formatted tables. This array tells the program
C           the number of data (channel) columns in each table (not
C           counting the first column that is always time)
C           DATA NBLKFIL/13,13,13,13,13,13,13,13,13,13,13,13,13
C           1 ,13,13,15,15,15,15,15,15,15,15,15,15/
C
C           User initial Input/output:
C           WRITE (*,990)
C           990 FORMAT (' This program will extract specified channels from',/,
C           2' Base Line Validation Fire Test data files. The program',/,
C           3' will generally recognize the specified files. However, if',/,
C           4' it is unable to extract a recognized test number from the',/,
C           5' file name specified the user will be queried for the file',/,
C           6' format information needed. File name formats which will',/,
C           7' be recognized by the program are as follows:',/,
C           8' TEST#RPT.DAT or TST##RPT.DAT',/,
C           9' the critical factor being the location of the numbers.',/)
C           0' The data file must be in the current working directory!!',/)
C           Begin input queries:
C           WRITE (*,1000)
C           1000 FORMAT (' ENTER NAME OF FILE TO BE READ',/)
C           READ (*,2039)FNAME
C           2039 FORMAT (A40)
C           We extract the test number by picking out the
C           two integers in the middle of the file name,
C           and converting from ASCII characters to numbers.
C           (This is why file name is so important)
C           NUMTEST=0
C           IF ((FNAME(1:3).EQ.'TES').OR.(FNAME(1:3).EQ.'tes')) THEN
C           if filename starts "TES" then may be any known file
C           NUMTEST=ICHAR(FNAME(5:5))-48
C           IF ((FNAME(4:4).NE.'T').AND.(FNAME(4:4).NE.'t')) THEN
C           NUMTEST=NUMTEST+10*(ICHAR(FNAME(4:4))-48)

```



```

        ENDIF
    ELSE IF ((FNAME(1:3).EQ.'TST').OR.(FNAME(1:3).EQ.'tst')) THEN
C      if filename starts "TST" then 2-digit for sure:
        NUMTEST=ICHAR(FNAME(5:5))-48+10*(ICHAR(FNAME(4:4))-48)
    ENDIF
C      check for a valid test number and get one if
C      the above did not give one
    IF ((NUMTEST.LT.1).OR.(NUMTEST.GT.25)) THEN
        NUMTEST=0
        WRITE (*,1105)
1105    FORMAT (' Test file not recognized as an expected',/,
1      ' file name, need to know test number')
        WRITE (*,991)
    991    FORMAT (' What is the test number (1-25)?')
        READ (*,2001)NUMTEST
    2001    FORMAT (I5)
    ELSE
        WRITE (*,1100)NUMTEST
    1100    FORMAT (' File recognixed as test #',I3)
    ENDIF
C      If we still don't have a valid test number, then
C      might as well quit because program will crash anyway
    IF ((NUMTEST.LT.1).OR.(NUMTEST.GT.25)) THEN
        WRITE (*,1101)
    1101    FORMAT (' Invalid test number, terminating!!!')
        STOP
    ENDIF
C      From here on we assume we have a valid test number
C      to work with and go accordingly!
C      The following is a generic input format statement used below:
    2009 FORMAT (A20)
C      Given a valid test number, the total number of channels
C      and the channels per block are known for all files:
        NTOT=306
        NROW=NBLKFIL(NUMTEST)
        SCANS=SCANFIL(NUMTEST)
C      query the user for the type of processing desired:
        WRITE (*,1002)
    1002 FORMAT (' How many channels to extract (50 MAX)?',/)
        READ (*,2001)NCHANS
        WRITE (*,1003)
    1003 FORMAT (' Enter channel list - separate with commas:',/)
        READ (*,2002)(ECHANS(I),I=1,NCHANS)
    2002 FORMAT (50I5)
C      initialize the various block/loop counters
        NBLK=0
        IOFF=0
        SECOND=0
C      Open the data file:
        OPEN (UNIT=1,FILE=FNAME,STATUS='OLD',ACTION='READ')
C      Initialize the main loop counter:
        KOUNT1=0
C
C      ***** TOP OF MAIN LOOP *****
C      WE RETURN HERE WHENEVER WE GO TO A NEW BLOCK OF
C      DATA CHANNEL NUMBERS (I.E. AFTER EACH "SCANS"
C      NUMBER OF TIME/DATA READS) UNTIL ALL CHANNELS

```

```

C          TO BE EXTRACTED ARE ACCOUNTED FOR.
C
C      line 5 is a entry point used only for the second pass at files
C      with more than 380 scans. These are special cases as the
C      channel blocks are split into two parts. For this case we do
C      need to reset the inner loop counters:
5      CONTINUE
C          initialize inner loop counters
C          NBLK=0
C          kount1 counts to see if we have accounted for all channels
C          to be extracted. When KOUNT1.EQ.NCHANS we are done:
C          KOUNT1=0
C      line 10 is the general loop top entry point for routine block
C      reads:
10     CONTINUE
C          initialize the counter to track the number or time/data
C          reads performed so far for the current block of channels
C          when KOUNT2.EQ.SCANS we have completed a channel block.
C          IOFF is either 0 or 380:
C          KOUNT2=IOFF
C          We increment the block counter now to keep track of the
C          number of blocks processed so far. The last block needs
C          special treatment so we need to know when we hit it.
C          NBLK=NBLK+1
C          Check now for reaching last block and reset row length if there
C          (THE LAST DATA BLOCK IS NOT FULL, BUT RATHER, HAS A REDUCED
C          NUMBER OF COLUMNS REPRESENTING THE LAST FEW DATA CHANNELS)
C          IF ((NBLK*NROW).GT.NTOT) THEN
C              LENROW=NROW-((NBLK*NROW)-NTOT)
C          ELSE
C              LENROW=NROW
C          ENDIF
C          skip the first/next 8 lines of in the file (this is the top
C          part of the table header and gets us to the line with the
C          channel numbers in it):
C          DO 20 K=1,8
C              READ (1,2004) ALPHA
2004      FORMAT (A1)
20      CONTINUE
C          Read off the channel number for the current block:
C          READ (1,2005) (CHANS(I),I=1,LENROW)
2005      FORMAT (15X,I3,14(5X,I3))
C          Initialize a flag array so we can mark the desired channels:
C          DO 30 K=1,LENROW
C              FLAG(K)=0
30      CONTINUE
C          Now we look for channels in this block that are to be extracted:
C          DO 40 K=1,LENROW
C              DO 40 J=1,NCHANS
C                  IF (CHANS(K).EQ.ECHANS(J)) THEN
C                      FLAG(K)=J
C                      KOUNT1=KOUNT1+1
C                  ENDIF
40      CONTINUE
C          Skip 3 lines in data file (the rest of the table header):
C          DO 50 K=1,3
C              READ (1,2004) ALPHA

```

```

50      CONTINUE
C
C          ***** TOP OF INNER LOOP *****
C          RETURN HERE UNTIL YOU HAVE MADE
C          "SCANS" TIME/DATA READS ON THIS BLOCK
C
60      CONTINUE
C
C          READ NEXT 40 LINES AS TIME/DATA UNTIL A TOTAL OF
C          "SCANS" READS FOR THIS BLOCK (MOST SUB-BLOCKS ARE 40 SCANS
C          LONG, BUT THE LAST BLOCK FOR EACH CHANNEL SET WILL
C          BE SHORTER)
C
      DO 70 K=1,40
C          Increment the inner loop counter to reflect block reads so far
      KOUNT2=KOUNT2+1
      READ (1,2006) SIGN,MIN,SEC,(DUMMY(I) (1:8),I=1,LENROW)
2006    FORMAT (A1,I3,1X,I3,2X,15(A8))
C          Convert the MIN:SEC format time to minutes only, check sign
      TIME(KOUNT2)=FLOAT(MIN)+FLOAT(SEC)/60.
      IF (SIGN.EQ.'-') TIME(KOUNT2)=-TIME(KOUNT2)
C          Check extraction flag and save flagged channels
      DO 80 J=1,LENROW
C          IF (FLAG(J).NE.0) THEN
C          have to check for bad channels or entries that are not numbers:
      IF (DUMMY(J) (1:1).NE.'*') THEN
          MULT=1.
          DO 81 I=1,8
              IF (DUMMY(J) (I:I).EQ.' ') THEN
                  SFL(I)=0
              ELSE IF (DUMMY(J) (I:I).EQ.'-') THEN
                  SFL(I)=0
                  MULT=-1.
              ELSE IF (DUMMY(J) (I:I).EQ.'.') THEN
                  SFL(I)=0
                  K1=I
              ELSE
                  SFL(I)=1
              ENDIF
81          CONTINUE
          DUM1=0.
          DO 82 I=1,K1-1
              IF (SFL(I).EQ.1) THEN
                  DUM1=DUM1+(10**(K1-I-1))*FLOAT(MULT
1              *(ICHAR(DUMMY(J) (I:I))-48))
              ENDIF
82          CONTINUE
          DO 83 I=K1,8
              IF (SFL(I).EQ.1) THEN
                  DUM1=DUM1+FLOAT(MULT*(ICHAR(DUMMY(J) (I:I))-48))
1              /(10**(I-K1))
              ENDIF
83          CONTINUE
          DATA(FLAG(J),KOUNT2)=DUM1
      ELSE
          DATA(FLAG(J),KOUNT2)=99999.
      ENDIF

```

```

            ENDIF
80      CONTINUE
C      check if we have made all needed reads for this block yet:
C      if yes then we jump out of inner loop and go do next block.
C      If not, then keep going with reads in inner loop.
C      files with more than 380 scans are a special case.
      IF (KOUNT2.GE.SCANS) GOTO 100
      IF (KOUNT2.GE.380.AND.SECOND.NE.1) GOTO 100
70      CONTINUE
C      if you get here then the channel block is not yet done but we
C      are at the end of a 40 scan sub-block. We skip 12 lines
C      and continue to read more data from this channel block
      DO 90 K=1,12
        READ (1,2004) ALPHA
90      CONTINUE
C      back to the top of the inner loop:
      GOTO 60

C
C      ***** END OF INNER LOOP *****
C      IF YOU GET HERE THE LAST CHANNEL BLOCK READ WAS COMPLETED.
C      CHECK TO SEE OF ALL TARGET CHANNELS HAVE BEEN
C      ACCOUNTED FOR - IF NOT SKIP 4 LINES TO ALLOW
C      FOR MAX VALUE/MAX TIME LINES AT END OF DATA BLOCKS
C      THEN WE GO BACK TO THE TOP OF MAIN LOOP AND
C      READ FROM NEXT BLOCK OF DATA CHANNELS
C      - ELSE GOTO OUTPUT SECTION
C      NOTE FILES WITH MORE THAN 380 SCANS ARE SPECIAL
C      CASES, APPLIES TO TESTS 21 AND 23-25. THESE
C      CASES HAVE CHANNEL BLOCKS SPLIT INTO TWO PARTS
C      AND REQUIRE SPECIAL HANDLING.
100     CONTINUE
      IF (KOUNT1.LT.NCHANS) THEN
        IF (SCANS.LE.380.OR.SECOND.EQ.1) THEN
          DO 110 K=1,4
            READ (1,2004) ALPHA
110     CONTINUE
          ENDIF
          GOTO 10
        ENDIF

C      HERE WE HANDLE THE FILES WITH MORE THAN 380 SCANS
C      HAVE TO CLOSE THE FILE AND REOPEN WHICH RESETS
C      POINTER TO THE TOP, THEN WE CHUNK THROUGH 10500
C      LINES TO GET TO THE TOP OF THE SECOND SET OF CHANNEL
C      BLOCKS, THEN READ AS BEFORE.
      IF (SCANS.GT.380.AND.SECOND.NE.1) THEN
        SECOND=1
        IOFF=380
        CLOSE (UNIT=1,STATUS='KEEP')
        OPEN (UNIT=1,FILE=FNAME,STATUS='OLD',ACTION='READ')
        DO 111 K=1,10500
          READ (1,2004) ALPHA
111     CONTINUE
        GOTO 5
      ENDIF

C
C      ***** END OF MAIN LOOP *****
C      at this point all data reading is done and we are

```

```

C          ready to output the data to file or screen.
C          ***** OUTPUT SECTION *****
C
C          CLOSE DATA FILE:
C          CLOSE (UNIT=1,STATUS='KEEP')
C          DETERMINE OUTPUT PARAMETERS:
115  WRITE (*,1010)
1010 FORMAT (' Do you want file or terminal display? (F OR T):',/)
      READ (*,2004) ALPHA
      IF (ALPHA.EQ.'F' .OR. ALPHA.EQ.'f') THEN
          GOTO 140
      ELSE IF (ALPHA.EQ.'T' .OR. ALPHA.EQ.'t') THEN
          GOTO 120
      ELSE
          GOTO 115
      ENDIF
C          THIS SECTION FOR TERMINAL DISPLAY OF EXTRACTED
C          CHANNELS
120  WRITE (*,1007)(ECHANS(I),I=1,NCHANS)
1007 FORMAT (2X,'TIME',10(I7))
      DO 130 K=1,SCANS
          WRITE (*,1008)TIME(K),(DATA(I,K),I=1,NCHANS)
1008  FORMAT (6E10.3,/, ' ')
130  CONTINUE
      GOTO 999
C          THIS SECTION FOR CREATION OF OUTPUT FILE
140  CONTINUE
      WRITE (*,1011)
1011 FORMAT (' Enter name for new data file to be created:',/)
      READ (*,2009)FNAME
      OPEN (UNIT=1,FILE=FNAME,STATUS='NEW')
C          FOR GENERAL FILES MAKE IT NICE ROW/COL FORMAT
C          PUT GENERAL INFORMATION AT TOP OF FILE, THAT IS,
C          TOTAL NUMBER OF SCANS, NUMBER OF CHANNELS EXTRACTED,
C          AND THE CHANNEL NUMBERS ACTUALLY EXTRACTED.
      WRITE (1,1012) SCANS,NCHANS,(ECHANS(I),I=1,NCHANS)
1012  FORMAT (1X,30I4)
C          FOR EACH SCAN, WRITE OUT TIME ONCE AND DATA VALUES FOR EACH
C          CHANNEL EXTRACTED WITH all VALUES ON A SINGLE LINE:
      DO 160 K=1,SCANS
          WRITE (1,1020) TIME(K),(DATA(I,K),I=1,NCHANS)
1020  FORMAT (F7.3,1X,30(E10.3,1X))
160  CONTINUE
C          ROUTINE COMPLETED, CLOSE OUTPUT FILE
      CLOSE (UNIT=1,STATUS='KEEP')
999  STOP
      END

```

Appendix B: General Channel Map

The channel map for all tests is identical. Some channels are not active in some tests, but the all channels are included in all of the main data report files. Non-active channels are typically logged as a “set to zero” channel. Also note that many of the later channels are derived data channels. These contain de-multiplexed gas concentration data, velocity data from the bi-directional probes, and other similar values derived during data post-processing. Each main data file contains a total of 306 data channels. This map identifies the nature, location, and associated units for each of these 306 channels. For a map of the Sector and Station locations, identification of the enclosure orientation, and the location of enclosure surface instruments refer to pages 11, 12 and B10-B12 of NUREG/CR-4681.

<u>Ch#</u> ,	<u>Data Type</u> ,	<u>Location</u> ,	<u>Units</u>
--------------	--------------------	-------------------	--------------

Channels 1-31 are aspirated thermocouples.

0001	ASP. T/C,	SECTOR 1,	0.98H (DEG C)
0002	ASP. T/C,	SECTOR 1,	0.90H (DEG C)
0003	ASP. T/C,	SECTOR 1,	0.70H (DEG C)
0004	ASP. T/C,	SECTOR 1,	0.50H (DEG C)
0005	ASP. T/C,	SECTOR 1,	0.30H (DEG C)
0006	ASP. T/C,	SECTOR 2,	0.98H (DEG C)
0007	ASP. T/C,	SECTOR 2,	0.90H (DEG C)
0008	ASP. T/C,	SECTOR 2,	0.70H (DEG C)
0009	ASP. T/C,	SECTOR 2,	0.50H (DEG C)
0010	ASP. T/C,	SECTOR 2,	0.30H (DEG C)
0011	ASP. T/C,	SECTOR 3,	0.98H (DEG C)
0012	ASP. T/C,	SECTOR 3,	0.90H (DEG C)
0013	ASP. T/C,	SECTOR 3,	0.70H (DEG C)
0014	ASP. T/C,	SECTOR 3,	0.50H (DEG C)
0015	ASP. T/C,	SECTOR 3,	0.30H (DEG C)
0016	ASP. T/C,	STATION 1,	0.98H (DEG C)
0017	ASP. T/C,	STATION 2,	0.98H (DEG C)
0018	ASP. T/C,	STATION 3,	0.98H (DEG C)
0019	ASP. T/C,	STATION 4,	0.98H (DEG C)
0020	ASP. T/C,	STATION 5,	0.98H (DEG C)
0021	ASP. T/C,	STATION 6,	0.98H (DEG C)
0022	ASP. T/C,	STATION 7,	0.98H (DEG C)
0023	ASP. T/C,	STATION 8,	0.98H (DEG C)
0024	ASP. T/C,	STATION 9,	0.98H (DEG C)
0025	ASP. T/C,	STATION 10,	0.98H (DEG C)
0026	ASP. T/C,	STATION 11,	0.98H (DEG C)
0027	ASP. T/C,	STATION 12,	0.98H (DEG C)
0028	ASP. T/C,	STATION 13,	0.98H (DEG C)
0029	ASP. T/C,	STATION 14,	0.98H (DEG C)
0030	ASP. T/C,	STATION 15,	0.98H (DEG C)
0031	ASP. T/C,	STATION 16,	0.98H (DEG C)

Channels 32-92 are bare-bead thermocouples.

0032	BB	GAS	T/C,	SEC.1,	0.98H (DEG C)
0033	BB	GAS	T/C,	SEC.1,	0.70H (DEG C)
0034	BB	GAS	T/C,	SEC.1,	0.30H (DEG C)
0035	BB	GAS	T/C,	SEC.2,	0.98H (DEG C)
0036	BB	GAS	T/C,	SEC.2,	0.70H (DEG C)
0037	BB	GAS	T/C,	SEC.2,	0.30H (DEG C)
0038	BB	GAS	T/C,	SEC.3,	0.98H (DEG C)
0039	BB	GAS	T/C,	SEC.3,	0.70H (DEG C)
0040	BB	GAS	T/C,	SEC.3,	0.30H (DEG C)
0041	BB	GAS	T/C,	STATION 1,	0.90H (DEG C)
0042	BB	GAS	T/C,	STATION 1,	0.70H (DEG C)
0043	BB	GAS	T/C,	STATION 1,	0.50H (DEG C)
0044	BB	GAS	T/C,	STATION 1,	0.30H (DEG C)
0045	BB	GAS	T/C,	STATION 2,	0.90H (DEG C)
0046	BB	GAS	T/C,	STATION 2,	0.70H (DEG C)
0047	BB	GAS	T/C,	STATION 2,	0.50H (DEG C)
0048	BB	GAS	T/C,	STATION 2,	0.30H (DEG C)
0049	BB	GAS	T/C,	STATION 3,	0.90H (DEG C)
0050	BB	GAS	T/C,	STATION 3,	0.70H (DEG C)
0051	BB	GAS	T/C,	STATION 3,	0.50H (DEG C)
0052	BB	GAS	T/C,	STATION 3,	0.30H (DEG C)
0053	BB	GAS	T/C,	STATION 4,	0.90H (DEG C)
0054	BB	GAS	T/C,	STATION 4,	0.70H (DEG C)
0055	BB	GAS	T/C,	STATION 4,	0.50H (DEG C)
0056	BB	GAS	T/C,	STATION 4,	0.30H (DEG C)
0057	BB	GAS	T/C,	STATION 5,	0.90H (DEG C)
0058	BB	GAS	T/C,	STATION 5,	0.70H (DEG C)
0059	BB	GAS	T/C,	STATION 5,	0.50H (DEG C)
0060	BB	GAS	T/C,	STATION 5,	0.30H (DEG C)
0061	BB	GAS	T/C,	STATION 6,	0.90H (DEG C)
0062	BB	GAS	T/C,	STATION 6,	0.70H (DEG C)
0063	BB	GAS	T/C,	STATION 6,	0.50H (DEG C)
0064	BB	GAS	T/C,	STATION 6,	0.30H (DEG C)
0065	BB	GAS	T/C,	STATION 7,	0.90H (DEG C)
0066	BB	GAS	T/C,	STATION 7,	0.70H (DEG C)
0067	BB	GAS	T/C,	STATION 7,	0.50H (DEG C)
0068	BB	GAS	T/C,	STATION 7,	0.30H (DEG C)
0069	BB	GAS	T/C,	STATION 8,	0.90H (DEG C)
0070	BB	GAS	T/C,	STATION 8,	0.70H (DEG C)
0071	BB	GAS	T/C,	STATION 8,	0.50H (DEG C)
0072	BB	GAS	T/C,	STATION 8,	0.30H (DEG C)
0073	BB	GAS	T/C,	STATION 9,	0.90H (DEG C)
0074	BB	GAS	T/C,	STATION 9,	0.70H (DEG C)
0075	BB	GAS	T/C,	STATION 9,	0.50H (DEG C)
0076	BB	GAS	T/C,	STATION 9,	0.30H (DEG C)
0077	BB	GAS	T/C,	STATION 10,	0.90H (DEG C)
0078	BB	GAS	T/C,	STATION 10,	0.70H (DEG C)

0079	BB GAS T/C,	STATION 10,	0.50H (DEG C)
0080	BB GAS T/C,	STATION 10,	0.30H (DEG C)
0081	BB GAS T/C,	STATION 17,	0.98H (DEG C)
0082	BB GAS T/C,	STATION 17,	0.90H (DEG C)
0083	BB GAS T/C,	STATION 17,	0.70H (DEG C)
0084	BB GAS T/C,	STATION 17,	0.50H (DEG C)
0085	BB GAS T/C,	STATION 17,	0.30H (DEG C)
0086	BB GAS T/C,	STATION 18,	0.98H (DEG C)
0087	BB GAS T/C,	STATION 18,	0.90H (DEG C)
0088	BB GAS T/C,	STATION 18,	0.70H (DEG C)
0089	BB GAS T/C,	STATION 18,	0.50H (DEG C)
0090	BB GAS T/C,	STATION 18,	0.30H (DEG C)
0091	BB GAS T/C,	VENT INLET	(DEG C)
0092	BB GAS T/C,	VENT OUTLET	(DEG C)

Channels 93-139 are surface thermocouples for the walls, ceiling and floor.

0093	IN CEIL SURF T/C,	SECTOR 1	(DEG C)
0094	OUT CEIL SURF T/C,	SECTOR 1	(DEG C)
0095	IN CEIL SURF T/C,	SECTOR 2	(DEG C)
0096	OUT CEIL SURF T/C,	SECTOR 2	(DEG C)
0097	IN CEIL SURF T/C,	SECTOR 3	(DEG C)
0098	OUT CEIL SURF T/C,	SECTOR 3	(DEG C)
0099	IN CEIL SURF T/C,	STATION 1	(DEG C)
0100	IN CEIL SURF T/C,	STATION 2	(DEG C)
0101	IN CEIL SURF T/C,	STATION 3	(DEG C)
0102	IN CEIL SURF T/C,	STATION 4	(DEG C)
0103	IN CEIL SURF T/C,	STATION 5	(DEG C)
0104	IN CEIL SURF T/C,	STATION 6	(DEG C)
0105	IN CEIL SURF T/C,	STATION 7	(DEG C)
0106	IN CEIL SURF T/C,	STATION 8	(DEG C)
0107	IN CEIL SURF T/C,	STATION 9	(DEG C)
0108	IN CEIL SURF T/C,	STATION 10	(DEG C)
0109	IN WALL SURF T/C,	N-C 0.90H	(DEG C)
0110	OUT WALL SURF T/C,	N-C 0.90H	(DEG C)
0111	IN WALL SURF T/C,	N-C 0.50H	(DEG C)
0112	OUT WALL SURF T/C,	N-C 0.50H	(DEG C)
0113	IN WALL SURF T/C,	N-R 0.90H	(DEG C)
0114	IN WALL SURF T/C,	N-R 0.50H	(DEG C)
0115	IN WALL SURF T/C,	N-L 0.90H	(DEG C)
0116	IN WALL SURF T/C,	N-L 0.50H	(DEG C)
0117	IN WALL SURF T/C,	S-C 0.90H	(DEG C)
0118	OUT WALL SURF T/C,	S-C 0.90H	(DEG C)
0119	IN WALL SURF T/C,	S-C 0.50H	(DEG C)
0120	OUT WALL SURF T/C,	S-C 0.50H	(DEG C)
0121	IN WALL SURF T/C,	S-R 0.90H	(DEG C)
0122	IN WALL SURF T/C,	S-R 0.50H	(DEG C)
0123	IN WALL SURF T/C,	S-L 0.90H	(DEG C)

0124 IN WALL SURF T/C, S-L 0.50H (DEG C)
 0125 IN WALL SURF T/C, E-R 0.90H (DEG C)
 0126 OUT WALL SURF T/C, E-R 0.90H (DEG C)
 0127 IN WALL SURF T/C, E-R 0.50H (DEG C)
 0128 IN WALL SURF T/C, E-L 0.90H (DEG C)
 0129 OUT WALL SURF T/C, E-L 0.90H (DEG C)
 0130 IN WALL SURF T/C, E-L 0.50H (DEG C)
 0131 IN WALL SURF T/C, W-R 0.90H (DEG C)
 0132 OUT WALL SURF T/C, W-R 0.90H (DEG C)
 0133 IN WALL SURF T/C, W-R 0.50H (DEG C)
 0134 IN WALL SURF T/C, W-L 0.90H (DEG C)
 0135 OUT WALL SURF T/C, W-L 0.90H (DEG C)
 0136 IN WALL SURF T/C, W-L 0.50H (DEG C)

Channels 137-161 are only used in Tests 19-25. Some channels are unique to the cabinet fire tests 21-25.

0137 CABINET TOP T/C, SECTOR 1 (DEG C)
 0138 SURFACE T/C FACING CAB A (DEG C)
 0139 CABINET TOP T/C, SECTOR 3 (DEG C)
 0140 CABLE IGNITION T/C #1 (DEG C)
 0141 CABLE IGNITION T/C #2 (DEG C)
 0142 CAB C DOOR-BOTTOM GAS T/C (DEG C)
 0143 CAB A FRONT BENCH WALL (DEG C)
 0144 CAB A LEFT WALL LOW T/C (DEG C)
 0145 CAB A LEFT WALL HIGH T/C (DEG C)
 0146 SURFACE T/C FOR CAB HF#4 (DEG C)
 0147 CAB A CENTER-HIGH GAS T/C (DEG C)
 0148 CAB A RIGHT WALL LOW T/C (DEG C)
 0149 CAB A RIGHT WALL HIGH T/C (DEG C)
 0150 CAB C DOOR-TOP GAS T/C (DEG C)
 0151 CAB D GAS T/C NEAR WALL (DEG C)
 0152 CAB D GAS T/C CENTER (DEG C)
 0153 CAB B VENT IN GAS T/C (DEG C)
 0154 CAB B RIGHT WALL-LOW T/C (DEG C)
 0155 CAB B RIGHT WALL-HIGH T/C (DEG C)
 0156 CAB B LEFT WALL-HIGH T/C (DEG C)
 0157 CAB B GAS T/C CENTER-HIGH (DEG C)
 0158 CAB B GAS T/C CENTER-DOOR (DEG C)
 0159 SURFACE T/C FACING CAB C (DEG C)
 0160 CAB C GAS T/C CENTER-LOW (DEG C)
 0161 CAB C GAS T/C CENTER-HIGH (DEG C)

Channels 162-179 are raw temperature responses for the large and small sphere calorimeters. Data post processing results for velocity, radiative and convective heat flux rates are provided in separate data files.

0162 LRG.SPH.CAL., SECTOR 1 0.98H (DEG C)
 0163 SML.SPH.CAL., SECTOR 1 0.98H (DEG C)

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0164 LRG.SPH.CAL., SECTOR 1 0.70H (DEG C)
0165 SML.SPH.CAL., SECTOR 1 0.70H (DEG C)
0166 LRG.SPH.CAL., SECTOR 1 0.30H (DEG C)
0167 SML.SPH.CAL., SECTOR 1 0.30H (DEG C)
0168 LRG.SPH.CAL., SECTOR 2 0.98H (DEG C)
0169 SML.SPH.CAL., SECTOR 2 0.98H (DEG C)
0170 LRG.SPH.CAL., SECTOR 2 0.70H (DEG C)
0171 SML.SPH.CAL., SECTOR 2 0.70H (DEG C)
0172 LRG.SPH.CAL., SECTOR 2 0.30H (DEG C)
0173 SML.SPH.CAL., SECTOR 2 0.30H (DEG C)
0174 LRG.SPH.CAL., SECTOR 3 0.98H (DEG C)
0175 SML.SPH.CAL., SECTOR 3 0.98H (DEG C)
0176 LRG.SPH.CAL., SECTOR 3 0.70H (DEG C)
0177 SML.SPH.CAL., SECTOR 3 0.70H (DEG C)
0178 LRG.SPH.CAL., SECTOR 3 0.30H (DEG C)
0179 SML.SPH.CAL., SECTOR 3 0.30H (DEG C)

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Channels 180-197 are raw velocity measurement made using paired bi-directional pressure/velocity probes. Post processing results are provided in channels 180-197.

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0180 HOR. FLOW PRB, SECTOR 1 0.98H (M/S)
0181 VER. FLOW PRB, SECTOR 1 0.98H (M/S)
0182 HOR. FLOW PRB, SECTOR 1 0.70H (M/S)
0183 VER. FLOW PRB, SECTOR 1 0.70H (M/S)
0184 HOR. FLOW PRB, SECTOR 1 0.30H (M/S)
0185 VER. FLOW PRB, SECTOR 1 0.30H (M/S)
0186 HOR. FLOW PRB, SECTOR 2 0.98H (M/S)
0187 VER. FLOW PRB, SECTOR 2 0.98H (M/S)
0188 HOR. FLOW PRB, SECTOR 2 0.70H (M/S)
0189 VER. FLOW PRB, SECTOR 2 0.70H (M/S)
0190 HOR. FLOW PRB, SECTOR 2 0.30H (M/S)
0191 VER. FLOW PRB, SECTOR 2 0.30H (M/S)
0192 HOR. FLOW PRB, SECTOR 3 0.98H (M/S)
0193 VER. FLOW PRB, SECTOR 3 0.98H (M/S)
0194 HOR. FLOW PRB, SECTOR 3 0.70H (M/S)
0195 VER. FLOW PRB, SECTOR 3 0.70H (M/S)
0196 HOR. FLOW PRB, SECTOR 3 0.30H (M/S)
0197 VER. FLOW PRB, SECTOR 3 0.30H (M/S)

0198 INLET DUCT FLOW RATE (ACH)
0199 OUTLET DUCT FLOW RATE (ACH)
0200 PRESS. DIFF. ENCL. HI (in-H2O)
0201 PRESS. DIFF. ENCL. LO (in-H2O)

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Channels 202-203 are only used in the cabinet fire tests.

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0202 PRESS. DIFF. CABINET IN (in-H2O)
0203 PRESS. DIFF. CABINET OUT (in-H2O)

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Channels 204-208 are single-beam smoke turbidimeters. Channels 209-211 represent a single three-beam turbidimeter.

0204	BLUE OPT.DEN.,	SECTOR 1	0.98H (1/M)
0205	BLUE OPT.DEN.,	SECTOR 1	0.30H (1/M)
0206	BLUE OPT.DEN.,	SECTOR 2	0.30H (1/M)
0207	BLUE OPT.DEN.,	SECTOR 3	0.98H (1/M)
0208	BLUE OPT.DEN.,	SECTOR 3	0.30H (1/M)
0209	BLUE OPT.DEN.,	SECTOR 2	0.98H (1/M)
0210	RED OPT.DEN.,	SECTOR 2	0.98H (1/M)
0211	IR OPT.DEN.,	SECTOR 2	0.98H (1/M)

Channels 212-219 are multiplexed gas analyzers covering three locations each. The data is de-multiplexed into channels 259-282.

0212	CO2 MULTIPLEXED SECTORS	0.98H (%)
0213	CO MULTIPLEXED SECTORS	0.98H (%)
0214	O2 MULTIPLEXED SECTORS	0.98H (%)
0215	THC MULTIPLEXED SECTORS	0.98H (PPM)
0216	CO2 MULTIPLEXED SECTORS	0.70H (%)
0217	CO MULTIPLEXED SECTORS	0.70H (%)
0218	CO2 MULTIPLEXED SECTORS	0.30H (%)
0219	CO MULTIPLEXED SECTORS	0.30H (%)
0220	CO2 SECTOR 2, 0.98H	(%) NON-MULTIPLEXED UNIT
0221	CO2 VENTILATION OUTLET	(%) NON-MULTIPLEXED UNIT

Channels 222-243 are surface heat flux gauges - the data on these channels appears to be unreliable in all tests.

0222	CEIL HEAT FLUX, SECTOR 1	(KW/M2)
0223	CEIL HEAT FLUX, SECTOR 2	(KW/M2)
0224	CEIL HEAT FLUX, SECTOR 3	(KW/M2)
0225	CEIL HEAT FLUX, STATION 1	(KW/M2)
0226	CEIL HEAT FLUX, STATION 2	(KW/M2)
0227	CEIL HEAT FLUX, STATION 3	(KW/M2)
0228	CEIL HEAT FLUX, STATION 8	(KW/M2)
0229	CEIL HEAT FLUX, STATION 9	(KW/M2)
0230	CEIL HEAT FLUX, STATION 10	(KW/M2)
0231	WALL HEAT FLUX, N-C	0.90H (KW/M2)
0232	WALL HEAT FLUX, N-R	0.90H (KW/M2)
0233	WALL HEAT FLUX, N-L	0.90H (KW/M2)
0234	WALL HEAT FLUX, S-C	0.90H (KW/M2)
0235	WALL HEAT FLUX, S-R	0.90H (KW/M2)
0236	WALL HEAT FLUX, S-L	0.90H (KW/M2)
0237	WALL HEAT FLUX, E-R	0.90H (KW/M2)
0238	WALL HEAT FLUX, E-L	0.90H (KW/M2)
0239	WALL HEAT FLUX, W-R	0.90H (KW/M2)
0240	WALL HEAT FLUX, W-L	0.90H (KW/M2)
0241	FLOOR HEAT FLUX, SECTOR 1	(KW/M2)
0242	FLOOR HEAT FLUX, SECTOR 2	(KW/M2)
0243	FLOOR HEAT FLUX, SECTOR 3	(KW/M2)

Channels 244-248 are water-cooled calorimeters and are only used in Tests 21-25. The location of each probe is unique to each test, see NUREG/CR-4527, V2.

0244	CABINET HEAT FLUX, #1	(KW/M2)
0245	CABINET HEAT FLUX, #2	(KW/M2)
0246	CABINET HEAT FLUX, #3	(KW/M2)
0247	CABINET HEAT FLUX, #4	(KW/M2)
0248	CABINET HEAT FLUX, #5	(KW/M2)

Channel 249 is not used in the gas burner tests.

0249	FUEL MASS LOSS	(KG/S)
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Channels 250-258 are intermediate processing channels and do not contain useful data.

0250	RAW CHANNEL FOR REDUCED CHANNEL NO.	212
0251	RAW CHANNEL FOR REDUCED CHANNEL NO.	213
0252	RAW CHANNEL FOR REDUCED CHANNEL NO.	216
0253	RAW CHANNEL FOR REDUCED CHANNEL NO.	217
0254	RAW CHANNEL FOR REDUCED CHANNEL NO.	218
0255	RAW CHANNEL FOR REDUCED CHANNEL NO.	219
0256	RAW CHANNEL FOR REDUCED CHANNEL NO.	220
0257	RAW CHANNEL FOR REDUCED CHANNEL NO.	221
0258	EVENT CHANNEL	

Channels 259-282 are generated by de-multiplexing the gas analysis channels 212-219 to generate individual location gas concentration data values:

0259	CO2 SECTOR 1, 0.98H	(%) FROM 212A
0260	CO2 SECTOR 2, 0.98H	(%) FROM 212B
0261	CO2 SECTOR 3, 0.98H	(%) FROM 212C
0262	CO SECTOR 1, 0.98H	(ppm) FROM 213A
0263	CO SECTOR 2, 0.98H	(ppm) FROM 213B
0264	CO SECTOR 3, 0.98H	(ppm) FROM 213C
0265	O2 SECTOR 1, 0.98H	(%) FROM 214A
0266	O2 SECTOR 2, 0.98H	(%) FROM 214B
0267	O2 SECTOR 3, 0.98H	(%) FROM 214C
0268	THC SECTOR 1, 0.98H	(%) FROM 215A
0269	THC SECTOR 2, 0.98H	(%) FROM 215B
0270	THC SECTOR 3, 0.98H	(%) FROM 215C
0271	CO2 SECTOR 1, 0.70H	(%) FROM 216A
0272	CO2 SECTOR 2, 0.70H	(%) FROM 216B
0273	CO2 SECTOR 3, 0.70H	(%) FROM 216C
0274	CO SECTOR 1, 0.70H	(ppm) FROM 217A
0275	CO SECTOR 2, 0.70H	(ppm) FROM 217B
0276	CO SECTOR 3, 0.70H	(ppm) FROM 217C
0277	CO2 SECTOR 1, 0.30H	(%) FROM 218A
0278	CO2 SECTOR 2, 0.30H	(%) FROM 218B
0279	CO2 SECTOR 3, 0.30H	(%) FROM 218C

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0280 CO SECTOR 1, 0.30H ( ppm ) FROM 219A
0281 CO SECTOR 2, 0.30H ( ppm ) FROM 219B
0282 CO SECTOR 3, 0.30H ( ppm ) FROM 219C

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Channels 283-306 are generated by processing of the bi-directional flow probes on Channels 180-197. A pair of (x-y) bi-direction probes is processed to estimate the total bulk fluid velocity and direction of flow per FMRC methods of analysis.

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0283 SPEED, SECTOR 1, 0.98H (M/S)
0284 DIRECTION, SECTOR 1, 0.98H (DEG) HORIZONTAL
0285 SPEED, SECTOR 1, 0.70H (M/S)
0286 DIRECTION, SECTOR 1, 0.70H (DEG) HORIZONTAL
0287 DIRECTION, SECTOR 1, 0.70H (SENSE) VERTICAL
0288 SPEED, SECTOR 1, 0.30H (M/S)
0289 DIRECTION, SECTOR 1, 0.30H (DEG) HORIZONTAL
0290 DIRECTION, SECTOR 1, 0.30H (SENSE) VERTICAL
0291 SPEED, SECTOR 2, 0.98H (M/S)
0292 DIRECTION, SECTOR 2, 0.98H (DEG) HORIZONTAL
0293 SPEED, SECTOR 2, 0.07H (M/S)
0294 DIRECTION, SECTOR 2, 0.70H (DEG) HORIZONTAL
0295 DIRECTION, SECTOR 2, 0.70H (SENSE) VERTICAL
0296 SPEED, SECTOR 2, 0.30H (M/S)
0297 DIRECTION, SECTOR 2, 0.30H (DEG) HORIZONTAL
0298 DIRECTION, SECTOR 2, 0.30H (SENSE) VERTICAL
0299 SPEED, SECTOR 3, 0.98H (M/S)
0300 DIRECTION, SECTOR 3, 0.98H (DEG) HORIZONTAL
0301 SPEED, SECTOR 3, 0.70H (M/S)
0302 DIRECTION, SECTOR 3, 0.70H (DEG) HORIZONTAL
0303 DIRECTION, SECTOR 3, 0.70H (SENSE) VERTICAL
0304 SPEED, SECTOR 3, 0.30H (M/S)
0305 DIRECTION, SECTOR 3, 0.30H (DEG) HORIZONTAL
0306 DIRECTION, SECTOR 3, 0.30H (SENSE) VERTICAL

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