GPU NUCLEAR

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January 03, 1997
6710-96-2412

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Gentlemen:

Subject: Three Mile Island Nuclear Generating Station, Unit 1 (TMI-1)
Operating License No. DPR-50
Docket No. 50-289
Thermo-Lag Response to Request for Additional Information

NRC letter dated November 20, 1996 (6710-96-3408) requested additional information regarding the TMI-1 request for exemption from 10 CFR 50 Appendix R, previously submitted by letters dated August 16, 1996 (6710-96-2229) and August 28, 1996 (6710-96-2301). The attachment provides an itemized response to each of the NRC questions.

If any additional information is required, please contact Mr. David J. Distel, GPU Nuclear Regulatory Affairs at (201) 316-7955.

Sincerely,

MJ Ross for

J. Knubel
Vice President & Director, TMI

DJD/jr
Attachment

cc: Administrator, Region I
NRC TMI Senior Resident Inspector
NRC Senior Project Manager, TMI

Add:
ACRS
NRR/PECB
NUDOCS-ABSTRACT
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NRC Question:

1. Topical Report #094, Rev. 1, page 7 states:

> To establish the barrier rating (ACTUAL RATING) of a test assembly, GPU Nuclear reviewed the temperature data for the test and identified the point in time when the first individual temperature reading....exceeded 325 degrees F above the initial temperature. Note that this method establishes a rating for all the elements of a particular raceway size based upon the weakest link in the raceway...it is conservative to establish a common rating for all elements of a raceway based upon a single high reading for the entire raceway.

This implies that the average temperature of the raceway (or cable tray) is not taken into account when making the determination of the fire rating of the assembly. Provide technical justification for this deviation from Generic Letter 86-10, Supplement 1.

2. For each fire barrier element, describe how consideration of the average temperatures will affect the fire rating analysis.

Response to Questions (1) and (2):

The responses to Questions 1 & 2 are combined as follows:

The average temperature of the raceway or cable tray was taken into account in the process of setting the criteria for establishing fire barrier ratings. Generic Letter 86-10, Supplement 1, states that:

> "The averages of any thermocouple group during the fire test should not exceed 139°C (250°F) above the unexposed side temperature within the fire barrier test specimen at the onset of the fire endurance test. In addition, the temperature of each individual thermocouple will be evaluated. Individual thermocouple conditions should not exceed the 139°C (250° F) temperature rise by more than 30 percent." (325°F above initial ambient)

In establishing fire barrier ratings, the use of the maximum individual thermocouple reading on the exterior surface of the raceway was adequate to establish fire barrier ratings. In the case of conduits, the maximum reading alone yields results consistent with the requirements of Generic Letter 86-10, Supplement 1, for 6- and 3-inch conduits because the maximum allowed was reached prior to the average allowable being reached. For ¾-inch conduit, the maximum reading alone yields higher rating results. For consistency, GPU Nuclear used the same data review methodology for all raceways rather than use the maximum temperature alone on 3- and 6-inch conduits and average temperature on ¾-inch conduit. It should be noted that GPU Nuclear used the weakest link in a particular tested configuration to establish a single barrier rating for all barrier types in that configuration. This is described in more detail later in this response.

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A review of the test data for conduits (data is from Omega Lab Report 13890-96143 (NEI Test 2-3)) shows the following:

EXTERIOR SURFACE	MAXIMUM TEMP ALLOWED	MAXIMUM TEMP	TIME	MAXIMUM AVERAGE TEMP ALLOWED	AVERAGE TEMP	TIME
6"	383°F	388°F	102 min.	309°F	310°F	102 min.
3"	383°F	385°F	91 min.	309°F	310°F	99 min.
¾"	385°F	387°F	69 min.	309°F	310°F	63 min.

As stated previously, the method for selecting a fire barrier rating as described in Topical Report #094 results in fire barrier ratings for 6-inch and 3-inch conduit consistent with Generic Letter 86-10, Supplement 1. For ¾-inch conduit, use of the maximum single point reading results in a higher fire barrier rating than the method endorsed by Generic Letter 86-10, Supplement 1; however, this is justified by the fact that use of external conduit surface temperature does not take into account the time delay for heat transfer from the outside to the inside surface. This is supported by the bare #8 conductor readings. Although these readings do not positively demonstrate inside surface temperature because the conductor may not be in contact with the inside surface, they conclusively demonstrate the delay from the outside to the inside surface. For example, at 69 minutes for the ¾-inch conduit, the maximum bare #8 conductor reading was 356°F vs. 387°F maximum recorded exterior surface temperature. At 69 minutes the average bare #8 conductor temperature was 310°F, the same as the exterior surface average temperature at 63 minutes. Also no structural failure or burn-through is evident at 69 minutes. The criteria of no structural failure or burn-through applies to all evaluations for all size conduits.

For cable tray, the maximum bare copper conductor temperature on the right rail of the 24 x 4 tray (325°F over initial ambient) was used to establish the barrier rating. This is consistent with Generic Letter, Supplement 1, because at 85 minutes into the test the average temperatures and all other single point readings were still acceptable. Therefore, 85 minutes is considered a conservative and acceptable fire barrier rating. For the 6 x4 tray, all average and single point readings were acceptable at 86 minutes into the test at which point the test was terminated.

The use of the single high reading to establish a fire barrier rating for all types of configurations on a raceway is considered conservative because both localized average and maximum temperatures at different locations on the tested raceway could result in higher fire barrier ratings for configurations such as condulets. Reviewing the thermocouple data for the ¾-inch conduit in NEI Test 2-3 suggests that condulets in that configuration could be rated at 96 minutes based upon the single maximum temperature vs. 69 minutes for straight conduit.

In summary, a review and comparison of the methodology used by GPU Nuclear and Generic Letter 86-10, Supplement 1, does not yield substantial differences in establishing fire barrier ratings for the tests evaluated. The only identified difference is 63 minutes

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(GL 86-10) vs. 69 minutes (GPU Nuclear) for the ¾-inch conduit which is not considered to be significant as discussed above. Both methods result in ratings which exceed 60 minutes which is considered adequate for the areas where the exemption from automatic suppression is requested.

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NRC Question:

3. Attachment 1 to Topical Report #094 describes 2.5-inch straight and radial bend conduits and condulets which are qualified by the test of a ¾-inch conduit/condulet. Provide a bounding analysis of the 2.5-inch conduits and condulets with respect to the test results of both the 3-inch conduits and condulets and the ¾-inch conduit and condulets.

Response:

Evaluations for Elements Numbers 284 (2.5-inch straight conduit), 285 (2.5-inch radial bend conduit), and 30 (2.5-inch condulet), as described in Attachment 1 to Topical Report #094, state that the comparable test configuration to the installed configuration is ¾ inches vs. 2.5 inches respectively. Using the results of the smaller test configuration as a comparison is necessary since no baseline 2.5-inch conduit 3-hour barrier envelope was tested. Use of the smaller configuration as a comparison is considered conservative since the results of testing of multiple size raceways in Test Assembly 2-3 show that the smaller the raceway, the faster acceptable internal or maximum allowed internal temperatures are reached.

The following is from Omega Point Lab Report No. 13890-94143, dated April 11, 1994, " Fire Endurance Test to Qualify a Protective Envelope for Class 1E Electrical Circuits." Page 11 presents the test data that serves as the basis for the evaluation as discussed above. After 102 minutes of exposure, the maximum and average conduit surface temperatures for the various size conduits were as follows (maximum temperatures are the highest individual thermocouple reading for the entire raceway assembly which includes straight, radial bends, and condulets):

	MAXIMUM TEMPERATURE (°F)	AVERAGE TEMPERATURE (°F)
6-inch conduit	388	310
3-inch conduit	470	322
¾-inch conduit	1205	580

Results of the testing confirms that under the same test conditions after 102 minutes, the conduit surface temperature for a 2.5-inch conduit assembly would not be higher than that of the ¾-inch conduit which means it is reasonable and conservative to apply bounding conduit surface temperature data for the ¾-inch conduit to a 2.5-inch conduit in establishing a fire barrier rating. In the case of the 2.5-inch conduit, the TMI-1 evaluation establishes a 69-minute rating for 2.5-inch conduit which is the same as that established for a ¾-inch conduit. It is evident from the test data trend that the 2.5-inch conduit would likely have a rating higher than 69 minutes. However, 69 minutes is used for conservatism since no specific test data is available for 2.5-inch conduit barriers constructed per this test assembly. Since the TMI-1 3-hour conduit barriers are constructed per this assembly, there is reasonable assurance that the TMI-1 2.5-inch conduit assembly has a fire barrier rating of at least 69 minutes.

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NRC Question:

4. The analysis of Elements Numbers 159 and 160, states that "...depth of the cable tray does not effect the out come of the test as the width does. This statement is made without any supporting rationale. Justify this statement.

Response:

The following discussion provides the basis for the above conclusion:

Structural weaknesses of panels have led to failure of barriers installed on the underside of larger cable trays such as the 24" x 4" trays. These failures do not appear to be caused by the side or depth dimension of the fire barrier but by the dimension of the unsupported span on the underside of the tray as stated above. The stresses imposed at joint locations as the underside panel softens during fire exposure leads to structural failure. Structural failure as a result of this softening does not occur on the sides of the barrier enclosure. GPU Nuclear therefore considers it reasonable to apply the test results for 24" x 4" trays to 24" x 6" trays and for 6" x 4" trays to 6" x 6" trays since the tested 4" side dimension vs. the installed 6" side dimension does not factor into the structural failure of the barrier.

Note that this description has been added to the evaluations for these two elements.

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NRC Question:

5. Describe the relationship between the fire barrier elements that are evaluated in Attachment 1 to Topical Report #094 and the corresponding fire barrier configurations installed in the various fire envelopes in individual plant fire areas as described in Enclosure A to your letter dated August 16, 1996.

Response:

Attachment 1 to Topical Report #094 provides the detailed evaluations of typical 3-hour fire barrier configurations to demonstrate how specific elements are bounded with accepted test configurations and how fire endurance ratings are established. Enclosure A to GPU Nuclear letter dated August 16, 1996 lists the results of all barrier evaluations, both bounded by accepted test configurations and those which could not be bounded. Those which could not be bounded will be upgraded to a fire barrier rating of 60 minutes. All barriers with a fire barrier rating less than three hours and equal to or greater than 60 minutes are the subject of the exemption request from automatic suppression and supporting analysis in the exemption request which is documented in Enclosure A.

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NRC Question:

6. Some Thermo-Lag assemblies mentioned in Enclosure A of your August 16, 1996, submittal, are not reviewed in Attachment 1 to Topical Report #094. For example, there are evaluations for 31 elements, yet there are over 40 elements listed in the exemption. Please resolve this discrepancy.

Response:

As discussed in the response to Question 5, Attachment 1 to Topical Report #094 provides the detailed evaluations of typical 3-hour barrier configurations to demonstrate how specific elements are bounded with accepted test configurations and how fire endurance ratings are established and provides examples which are representative of each of the 3-hour installed barrier configurations discussed in the exemption request (Enclosure A). Enclosure A does not list the total number of elements but identifies the type of element for which an exemption is requested to each fire area. For example, page 37 of Enclosure A identifies fire barrier envelope No.1CCE-FB07 as the one envelope in fire area CB-FA-2G for which the exemption is requested. There are 6 types of elements associated with this envelope. The number of elements per type is identified in Section 3.6 of Topical Report #094, page 12 of 16. The Topical Report identifies that there are three 2-inch conduit elements and a total of 8 elements that make up fire barrier envelope 1CCE-FB07. Attachment 1 included an evaluation for a 2-inch conduit (Element 334) which is typical of the evaluation for all 2-inch conduits.

The total number of elements for which an exemption is requested is 176 (Reference Section 3.0 of Topical Report #094). These 176 elements make up a total of 20 fire barrier envelopes in the fire areas/zones where exemptions have been requested. The following Table 1 provides a complete list of all 176 elements as discussed in our conference call of December 4, 1996. This list identifies for each fire area/fire zone: the associated fire barrier envelopes, the element numbers that comprise that envelope, and the type of barrier for that element. Note where size of the element is blank that the element is to be upgraded as GPUN Nuclear is unable to establish a legitimate fire endurance rating for these elements.

To summarize, Attachment 1 to Topical Report #094 includes typical evaluations which are representative of all configurations discussed in the exemption request. Section 3 of topical report identifies the results of all evaluations and Enclosure A extracts information from this section but excludes the total number of elements associated with a particular type of configuration to avoid repetition because the evaluation of a particular type of configuration is the same.

TABLE 1

TMI BARRIER REFERENCE REPORT - 3 HR

ENVELOPE NO.	ELEMENT NO	BARRIER COMPONENT	SIZE
FIREZONE CB-FA-02B			
1CCE-FB02	159	Cable Tray	24" X 6"
1CCE-FB02	160	Radial bend tray	24" x 6"
1CCE-FB02	299	Cable Tray	24" x 6"
1CCE-FB02	535	Penetration	
1CCE-FB02	563	Penetration	12" x 37"
1CCE-FB03	31	Penetration Interface	1.25"
1CCE-FB03	300	condulet	1.25"
1CCE-FB03	301	Conduit	1.25"
1CCE-FB03	302	Radial bend conduit	1.25"
1CCE-FB03	303	Conduit	1.25"
1CCE-FB03	304	Radial bend conduit	1.25"
1CCE-FB03	305	Conduit	1.25"
1CCE-FB03	306	Radial bend conduit	1.25"
1CCE-FB03	307	Conduit	1.25"
1CCE-FB03	309	condulet	1.25"
1CCE-FB03	536	Conduit	1.25"
1CCE-FB03	537	Radial bend conduit	1.25"
1CCE-FB03	538	Conduit	1.25"
1CCE-FB03	539	Radial bend conduit	1.25"
1CCE-FB03	607	Conduit	1.25"
1CCE-FB09	36	Penetration	17.5"x 15"x 6"
1CCE-FB09	352	condulet	1"
1CCE-FB09	353	Radial bend conduit	1"
1CCE-FB09	354	Conduit	1"
1CCE-FB10	38	Conduit	1"
1CCE-FB10	359	Radial bend conduit	1"
1CCE-FB10	360	Conduit	1"
1CCE-FB10	361	condulet	1"
1CCE-FB10	362	Conduit	1"
1CCE-FB10	363	Radial bend conduit	1"
1CCE-FB10	364	Conduit	1"
1CCE-FB10	365	Radial bend conduit	1"
1CCE-FB10	366	Conduit	1"
1CCE-FB10	540	condulet	1"
1CCE-FB10	541	Penetration	
FIREZONE CB-FA-02C			
1CCE-FB03	175	condulet	1.25
1CCE-FB03	565	Conduit	1.25"
1CCE-FB03	573	Penetration Interface	1.25
1CCE-FB03	608	condulet	1.25
1CCE-FB09	37	condulet	1"
1CCE-FB09	356	Radial bend conduit	1"
1CCE-FB09	357	condulet	1"
1CCE-FB09	567	Penetration	
1CCE-FB09	568	Conduit	1"
1CCE-FB09	569	Penetration	8" x 12"
1CCE-FB09	582	Penetration Interface	
1CCE-FB09	609	condulet	1"
1CCE-FB10	39	Radial bend conduit	1"
1CCE-FB10	367	Conduit	1"
1CCE-FB10	368	Radial bend conduit	1"
1CCE-FB10	369	Conduit	1"
1CCE-FB10	370	Radial bend conduit	1"
1CCE-FB10	371	Conduit	1"
1CCE-FB10	372	Radial bend conduit	1"
1CCE-FB10	373	Conduit	1"

TABLE 1

TMI BARRIER REFERENCE REPORT - 3 HR

ENVELOPE NO.	ELEMENT NO	BARRIER COMPONENT	SIZE
FIREZONE CB-FA-02C			
1CCE-FB10	374	Radial bend conduit	1"
1CCE-FB10	375	Conduit	1"
1CCE-FB10	574	Penetration Interface	1"
FIREZONE CB-FA-02D			
1CCE-FB04	161	Conduit	0.75
1CCE-FB04	310	Radial bend conduit	0.75
1CCE-FB04	311	Conduit	0.75
1CCE-FB04	312	Radial bend conduit	0.75
1CCE-FB04	313	Conduit	0.75
1CCE-FB04	542	condulet	0.75
1CCE-FB04	543	Radial bend conduit	0.75
1CCE-FB04	544	Conduit	0.75
1CCE-FB04	576	Penetration	0.75
1CCE-FB04	597	condulet	0.75
1CCE-FB04	598	Conduit	0.75
1CCE-FB05	32	Conduit	1.5"
1CCE-FB05	314	condulet	1.5"
1CCE-FB05	315	Conduit	1.5"
1CCE-FB05	316	condulet	1.5"
1CCE-FB05	317	Radial bend conduit	1.5"
1CCE-FB05	318	Conduit	1.5"
1CCE-FB05	319	condulet	1.5"
1CCE-FB05	320	Conduit	1.5"
1CCE-FB05	577	Penetration Interface	1.5"
1CCE-FB06	33	Conduit	1.5"
1CCE-FB06	321	condulet	1.5"
1CCE-FB06	322	Conduit	1.5"
1CCE-FB06	323	Radial bend conduit	1.5"
1CCE-FB06	324	Conduit	1.5"
1CCE-FB06	325	Radial bend conduit	1.5"
1CCE-FB06	326	Conduit	1.5"
1CCE-FB06	327	Radial bend conduit	1.5"
1CCE-FB06	328	Conduit	1.5"
1CCE-FB06	329	Radial bend conduit	1.5"
1CCE-FB06	330	Conduit	1.5"
1CCE-FB06	331	condulet	1.5"
1CCE-FB06	578	Penetration Interface	1.5"
FIREZONE CB-FA-02E			
1CCE-FB07	34	condulet	2"
1CCE-FB07	332	Conduit	2"
1CCE-FB07	333	Radial bend conduit	2"
1CCE-FB07	334	Conduit	2"
1CCE-FB07	335	Radial bend conduit	2"
1CCE-FB07	336	Conduit	2"
1CCE-FB07	337	Radial bend conduit	2"
1CCE-FB07	338	Conduit	2"
1CCE-FB07	339	Radial bend conduit	2"
1CCE-FB07	340	Conduit	2"
1CCE-FB07	341	Radial bend conduit	2"
1CCE-FB07	342	Conduit	2"
1CCE-FB07	343	Penetration	
1CCE-FB07	581	Penetration	

TABLE 1

TMI BARRIER REFERENCE REPORT - 3 HR

ENVELOPE NO.	ELEMENT NO	BARRIER COMPONENT	SIZE
FIREZONE CB-FA-02F			
1CCE-FB08	35	Cable Tray	24" X 6"
1CCE-FB08	118	Box	30" X 36" X 12"
1CCE-FB08	350	radial bend tray	6" x 6"
FIREZONE CB-FA-02G			
1CCE-FB07	176	Conduit	2"
1CCE-FB07	344	Radial bend conduit	2"
1CCE-FB07	345	condulet	2"
1CCE-FB07	346	Conduit	2"
1CCE-FB07	347	condulet	2"
1CCE-FB07	348	Penetration	
1CCE-FB07	349	Conduit	2"
1CCE-FB07	579	Penetration Interface	2"
FIREZONE CB-FA-03A			
1CCG-FB01	40	Penetration	
1CCG-FB01	376	Radial bend conduit	2"
1CCG-FB01	377	Box	12"x 15"x 13.5"
1CCG-FB01	378	Conduit	2"
1CCG-FB01	379	Radial bend conduit	2"
1CCG-FB01	380	Conduit	2"
1CCG-FB05	389	condulet	2"
1CCG-FB05	390	Radial bend conduit	2"
1CCG-FB05	391	Conduit	2"
1CCG-FB05	392	Radial bend conduit	2"
1CCG-FB05	393	condulet	2"
1CCG-FB05	394	Conduit	2"
1CCG-FB05	395	Radial bend conduit	2"
1CCG-FB05	396	Conduit	2"
1CCG-FB05	397	Radial bend conduit	2"
1CCG-FB05	398	Conduit	2"
1CCG-FB05	580	Penetration Interface	2"
1CCG-FB05	602	Conduit	2"
FIREZONE CB-FA-03B			
1CCG-FB02	41	Penetration	23"x 17"x 5"
1CCG-FB02	381	Conduit	3"
1CCG-FB02	382	Radial bend conduit	3"
1CCG-FB02	383	Conduit	3"
1CCG-FB03	42	Penetration	16"x 11.5" x 3"
1CCG-FB03	384	condulet	1"
1CCG-FB03	385	Conduit	1"
1CCG-FB03	386	Radial bend conduit	1"
1CCG-FB03	387	condulet	1"
1CCG-FB03	388	Penetration	13"x 16" x 5"
1CCG-FB04	43	Conduit	0.75"
1CCG-FB05	45	Conduit	2"
1CCG-FB05	399	Box	35"x 10.5"x 16"
1CCG-FB05	400	Conduit	2"
1CCG-FB05	401	Radial bend conduit	2"
1CCG-FB05	402	Conduit	2"
1CCG-FB05	403	Radial bend conduit	2"
1CCG-FB05	404	Box	15"x 7"x 7"
1CCG-FB05	405	Conduit	2"
1CCG-FB05	545	Penetration Interface	2 inch

TABLE 1

TMI BARRIER REFERENCE REPORT - 3 HR

ENVELOPE NO.	ELEMENT NO	BARRIER COMPONENT	SIZE
FIREZONE CB-FA-03B			
1CCG-FB05	599	Radial bend conduit	2"
1CCG-FB05	600	Conduit	2"
1CCG-FB05	601	condulet	2"
FIREZONE FH-FZ-05			
1CCE-FB01	30	condulet	2.5"
1CCE-FB01	281	Radial bend conduit	2.5"
1CCE-FB01	282	Conduit	2.5"
1CCE-FB01	283	Radial bend conduit	2.5"
1CCE-FB01	284	Conduit	2.5"
1CCE-FB01	285	Radial bend conduit	2.5"
1CCE-FB01	286	Conduit	2.5"
1CCE-FB01	288	Radial bend conduit	2.5"
1CCE-FB01	289	Conduit	2.5"
1CCE-FB01	290	Radial bend conduit	2.5"
1CCE-FB01	291	Conduit	2.5"
1CCE-FB01	292	Radial bend conduit	2.5"
1CCE-FB01	293	Conduit	2.5"
1CCE-FB01	294	Radial bend conduit	2.5"
1CCE-FB01	296	Conduit	2.5"
1CCE-FB01	297	condulet	2.5"
1CCE-FB01	298	Conduit	2.5"
1CCE-FB01	605	Penetration Interface	
1CCE-FB01	606	Penetration Interface	

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NRC Question:

7. The following elements are listed as penetrations in Attachment 1 to Topical Report #094: 31, 573, 574, 582, 577, 578, 545, 605, and 606.

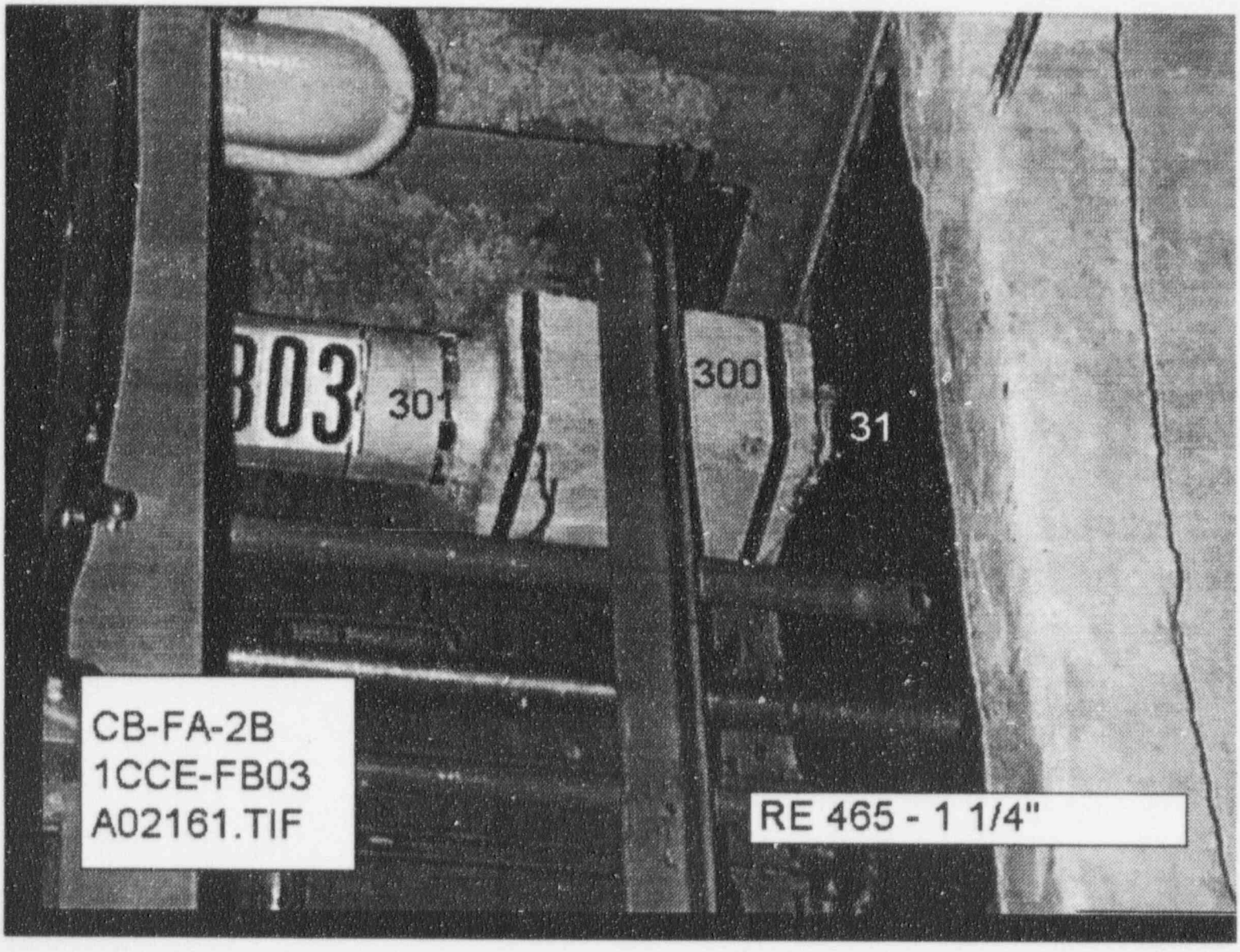
The NEI program did not test penetrations, and it is not clear from the evaluation of these elements how they are bounded by the fire tests that were discussed. Please clearly describe the configurations of these individual elements, as they are installed in the plant. Detailed drawings should be provided for further clarification. In addition, describe how these elements are bounded by the fire tests discussed in the evaluation.

Response:

The elements in question constitute elements which GPU Nuclear believes are adequately supported by NEI testing with respect to similarities in the construction of the interface point of Thermo-Lag fire barrier envelopes and the walls. Photographs of these elements are attached for information. Note that a photograph of Element 573 is not available; however, its configuration is as described below. We have modified how we designate these configurations in our electronic data base based upon our conference call of December 4, 1996. These configurations are now referred to as penetration interfaces in lieu of penetrations.

Element 31 is similar to the interface of all three conduits (6", 3", ¾") in NEI Test 2-3 with the test deck. The NEI configuration extended the test item with 1"-thick preformed Thermo-Lag through the test deck and sealed around the outside of the barrier with silicone foam at the opening through the test deck. The only difference between the tested configuration and Element 31 is that in the test, ceramic insulation was installed on the underside of the test deck instead of bare concrete which is the case for Element 31. The construction of Element 31 is the same inside the penetration as inside the test deck, and silicone foam is commonly used as a penetration seal and has been tested successfully as a one-hour seal. This provides confidence that the GPU Nuclear configuration is a one-hour fire barrier. The NEI test, although not identical in configuration, provides additional level of confidence that this configuration is acceptable.

Elements 573, 574, 582, 577, 578, 545, 605 and 606 consist of interface joints at concrete walls where Thermo-Lag terminates at the wall and is joined to the wall by pre-buttering the end of preformed Thermo-Lag with trowel grade and attaching to the wall or installing a "picture frame" on the wall and abutting the end of a preformed panel to the picture frame as in Element 545. NEI Tests 3-1 and 3-2 used similar interface joints which were not the cause of the test failures. Therefore, it is concluded that a pre-buttered Thermo-Lag to concrete interface joint is not a potential weak link and has been shown to provide protection for at least 60 minutes for 1"-thick Thermo-Lag based upon the results of the aforementioned NEI tests.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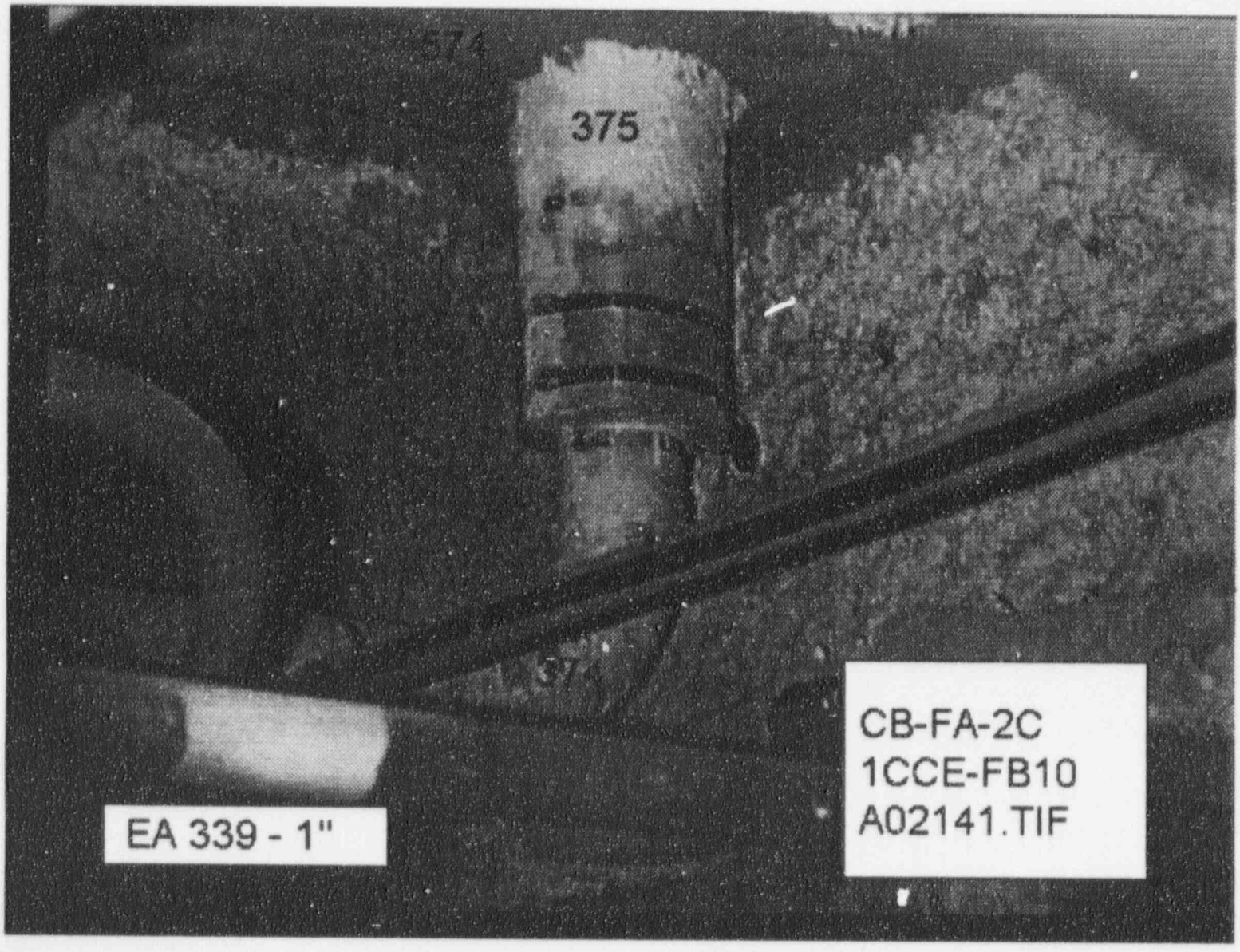
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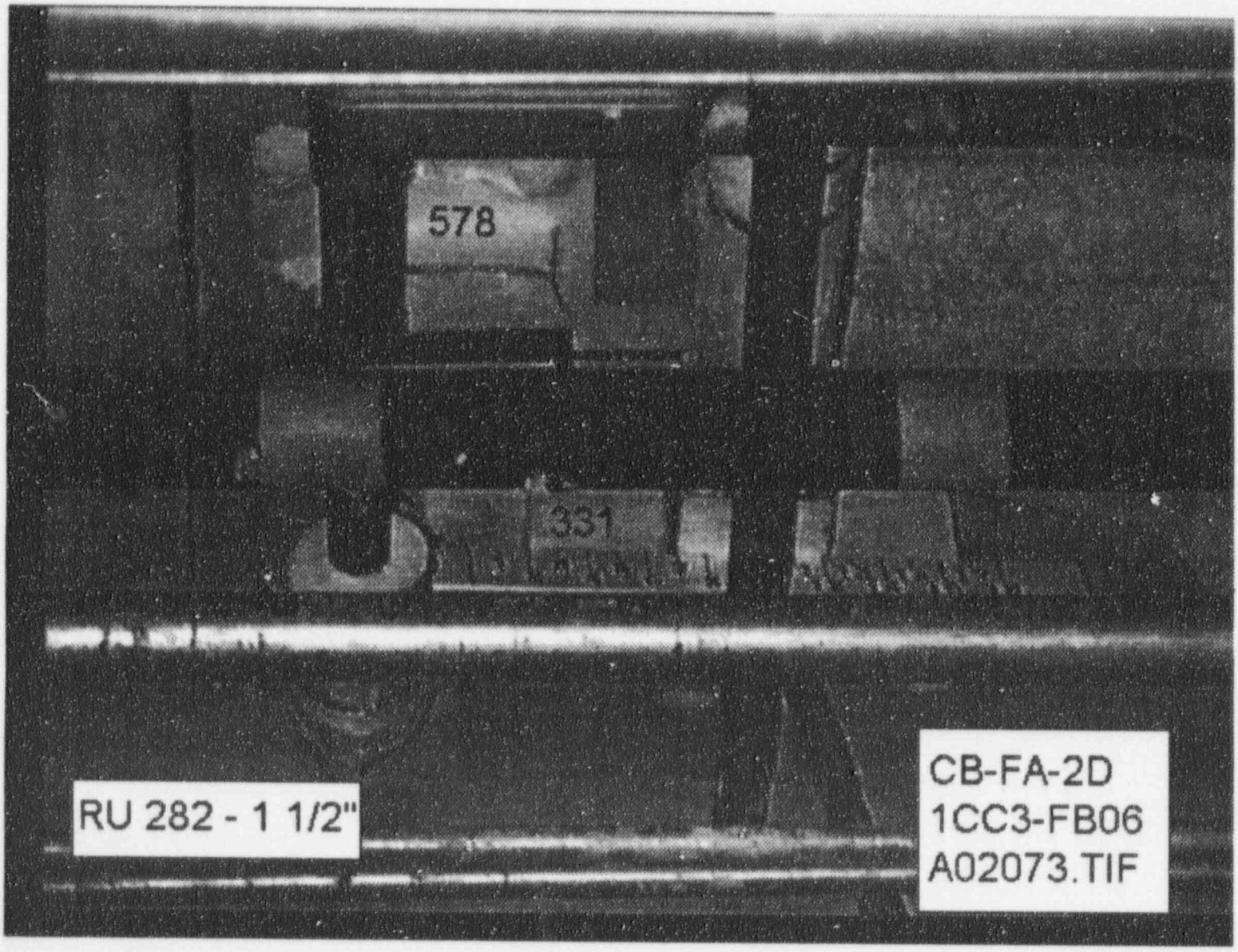
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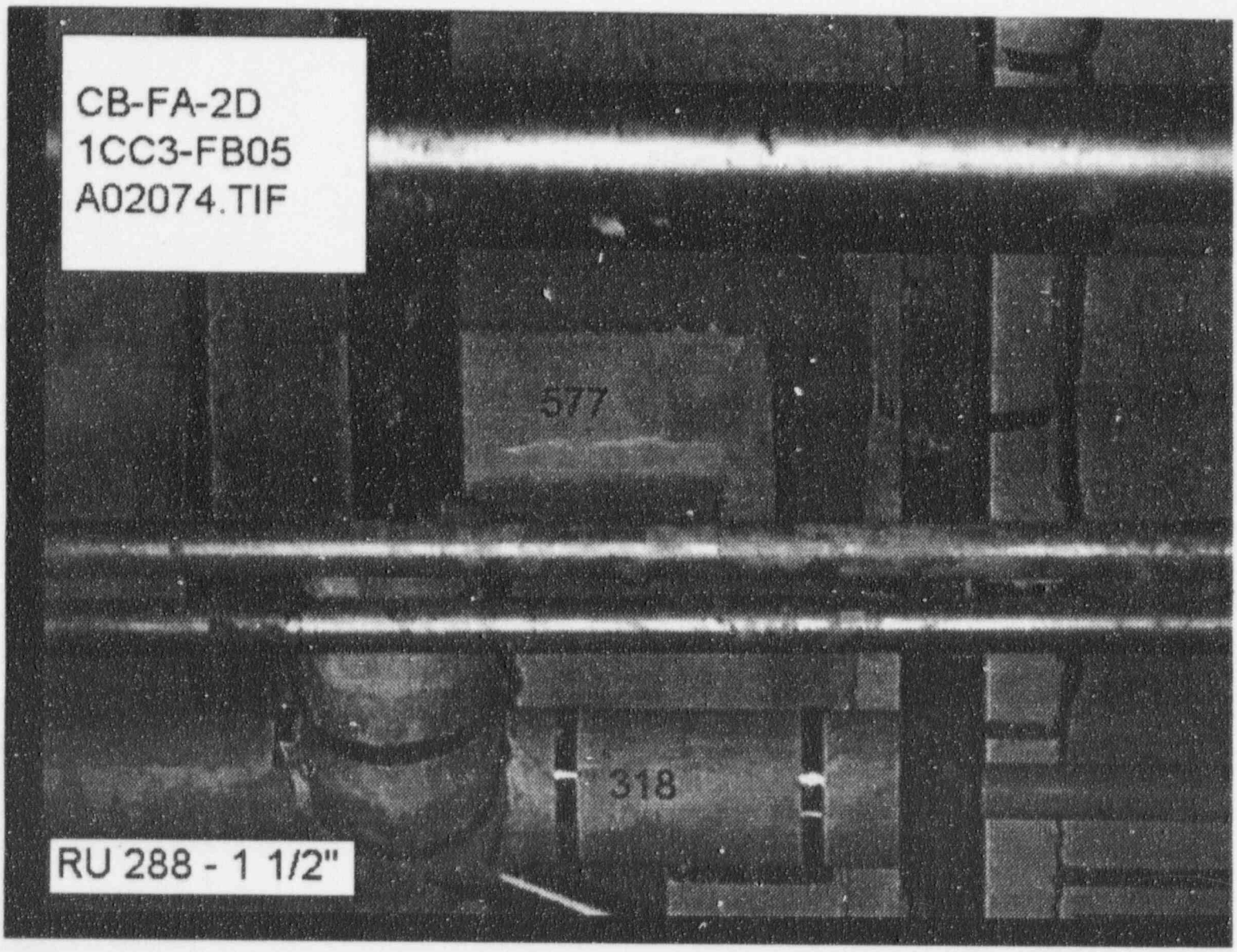
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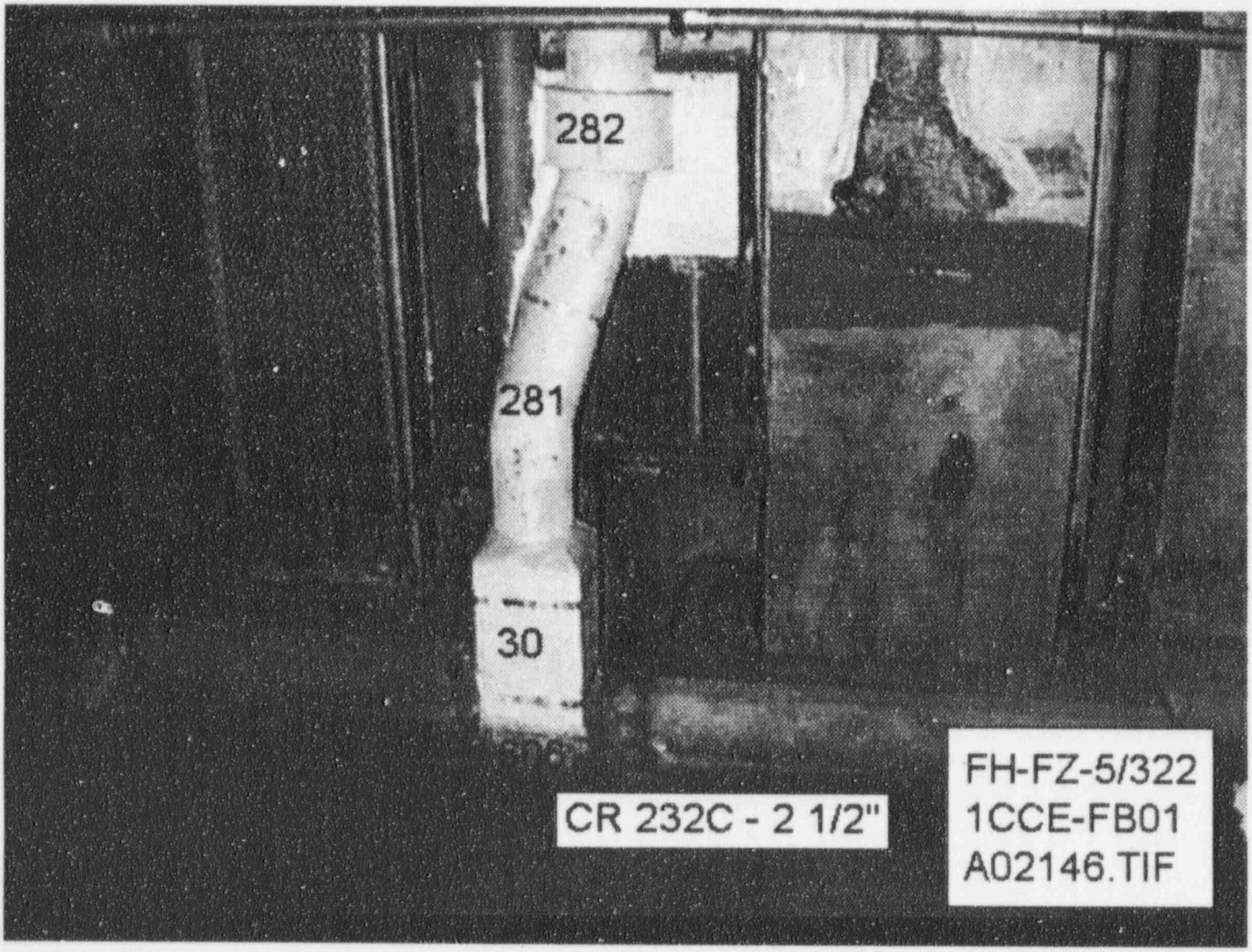
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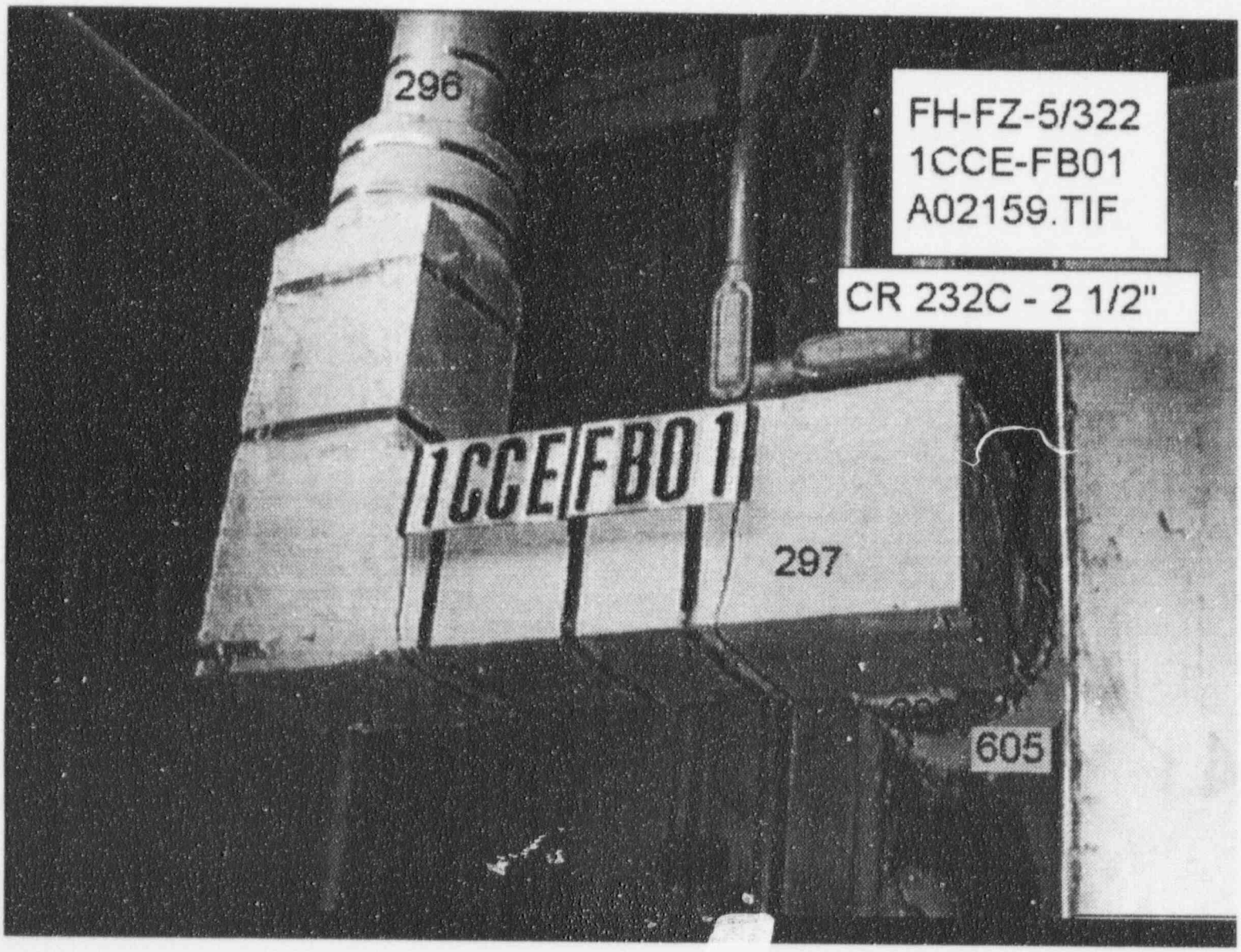
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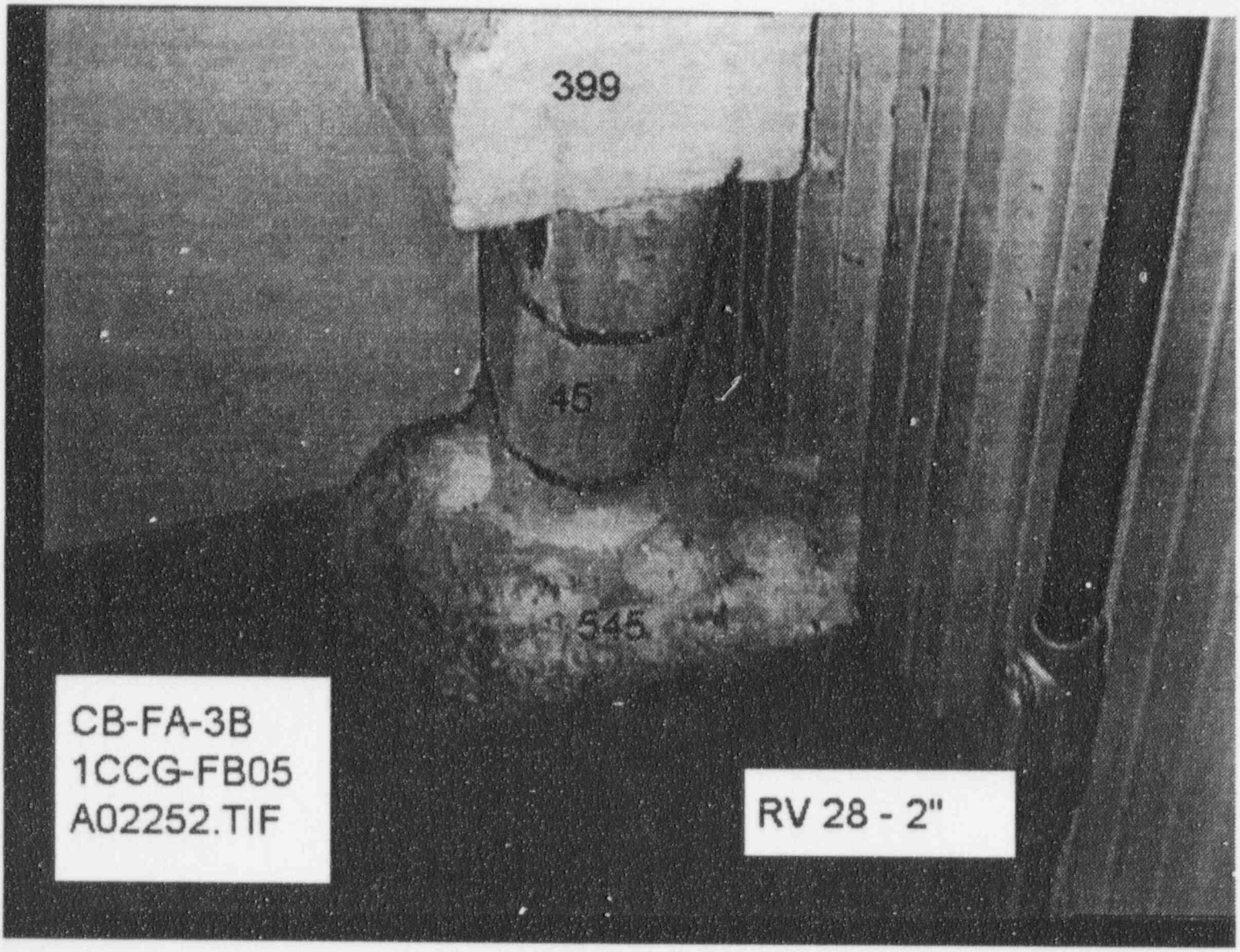
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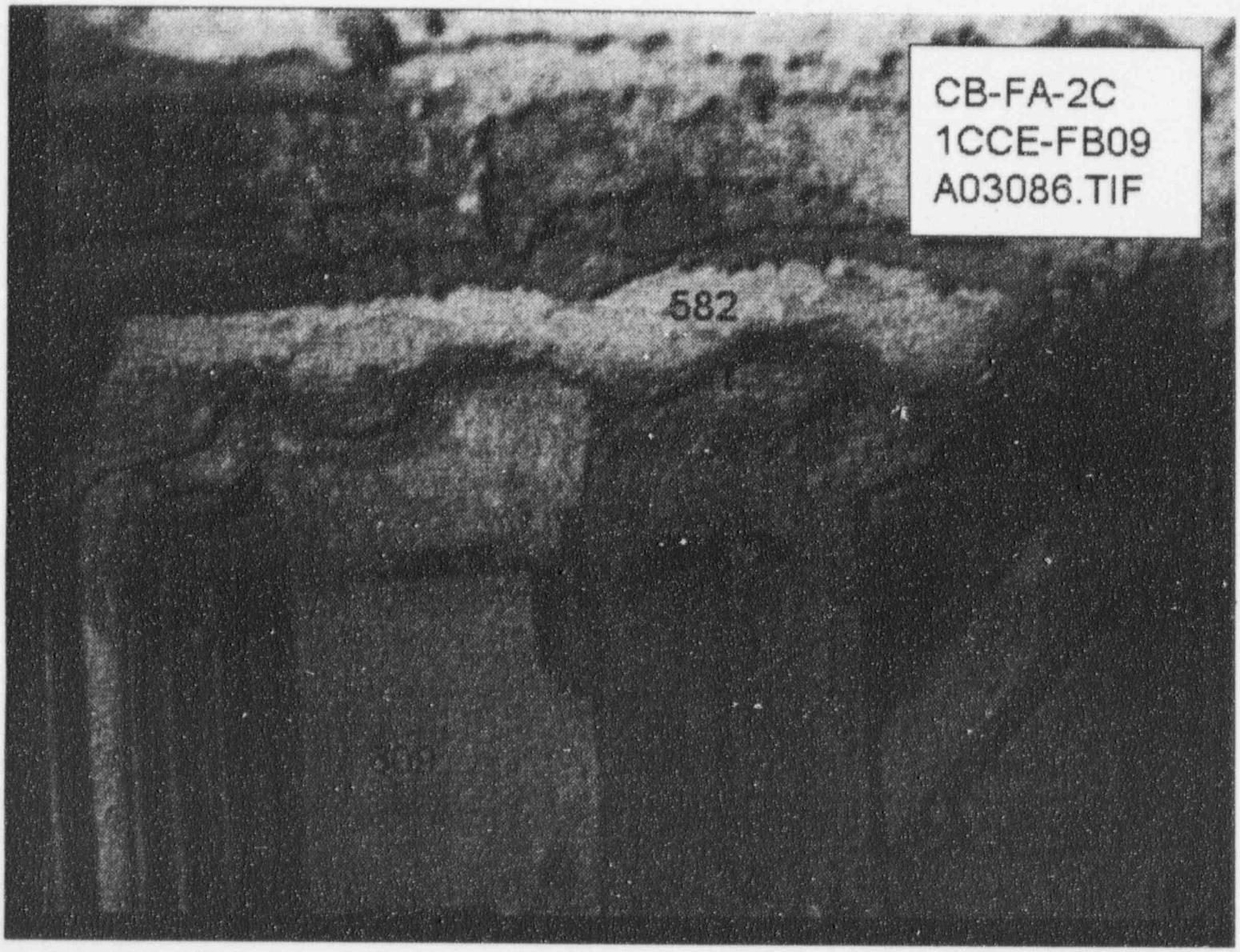
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B03
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300
31
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RE 465 - 1 1/4"


374
375
EA 339 - 1"
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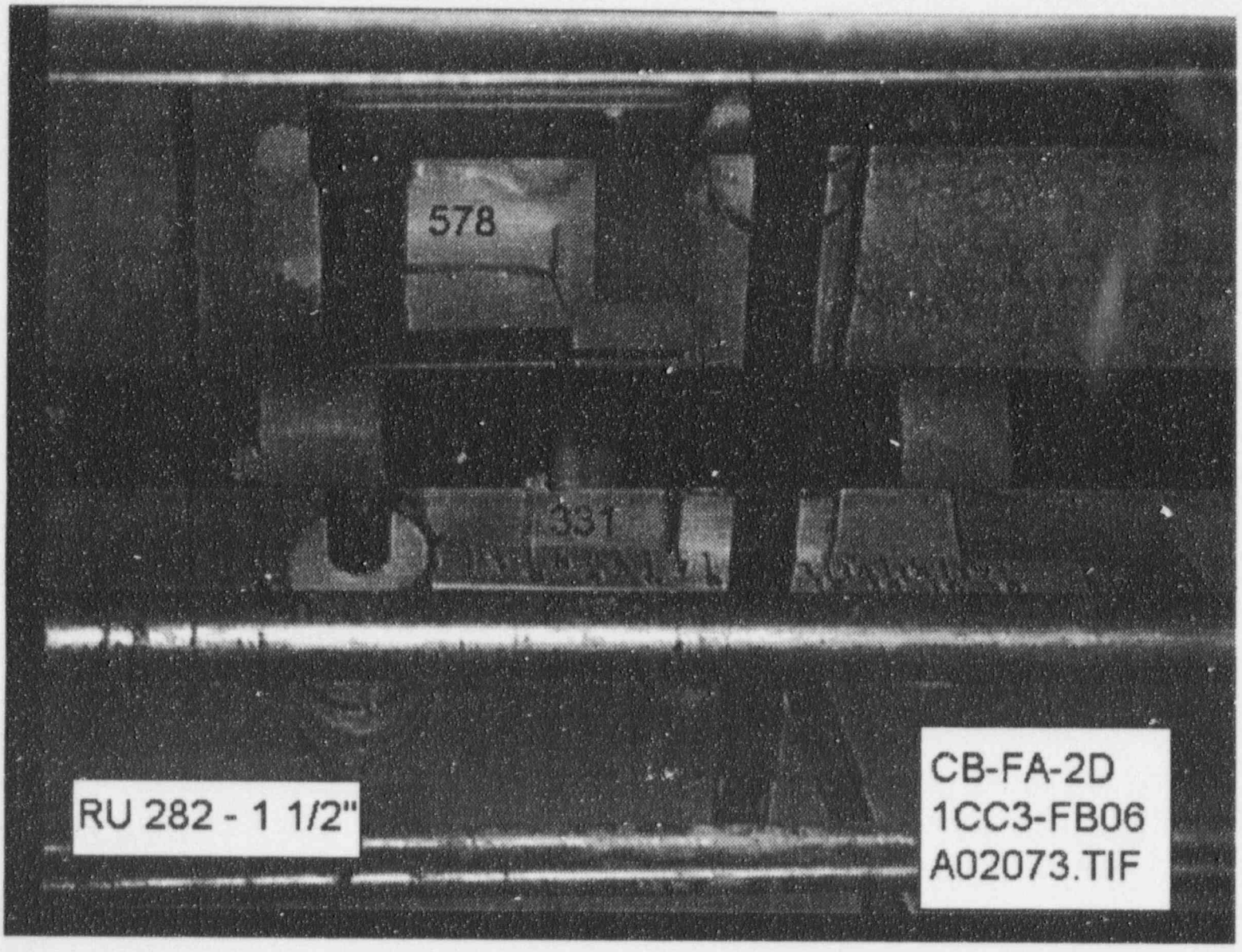
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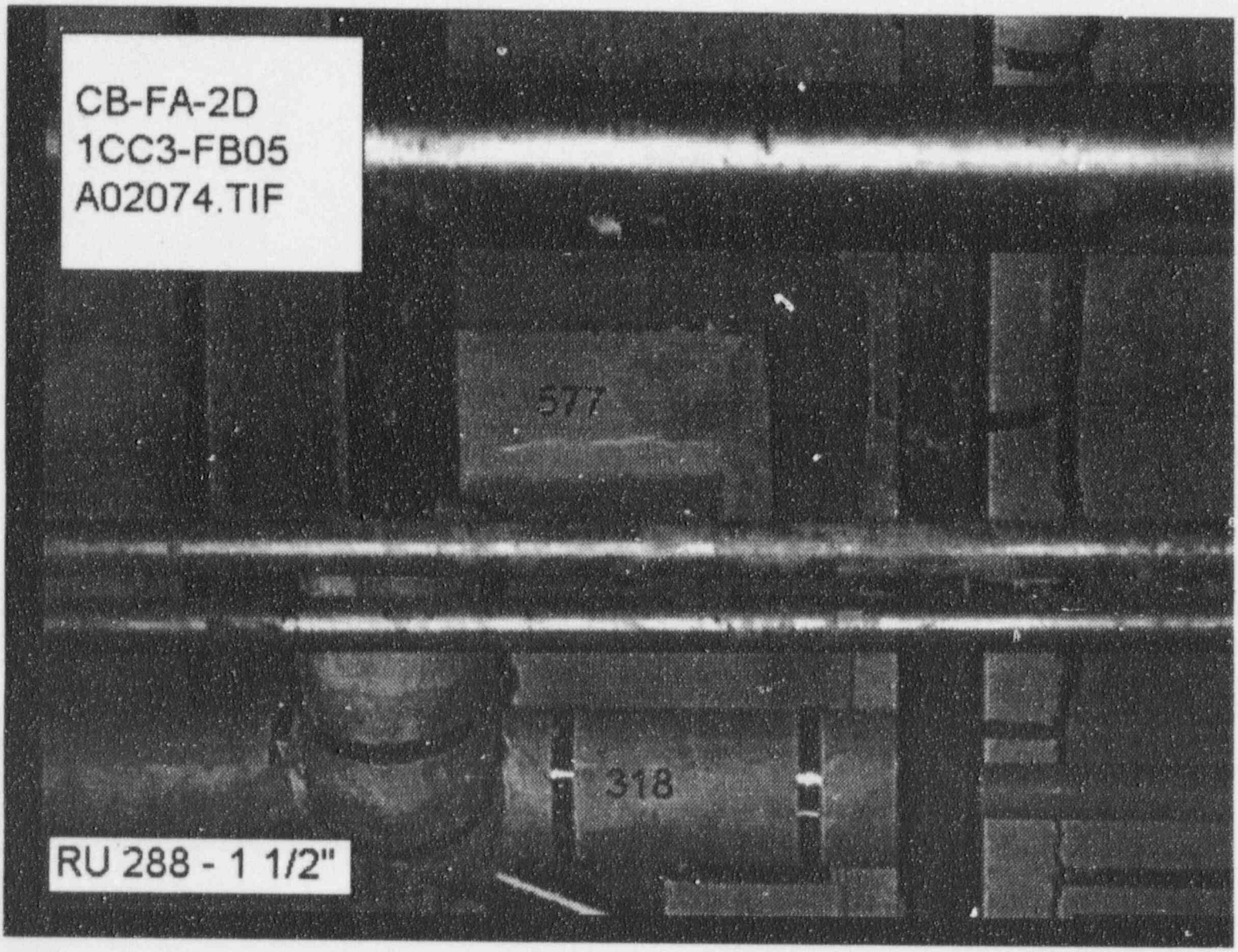
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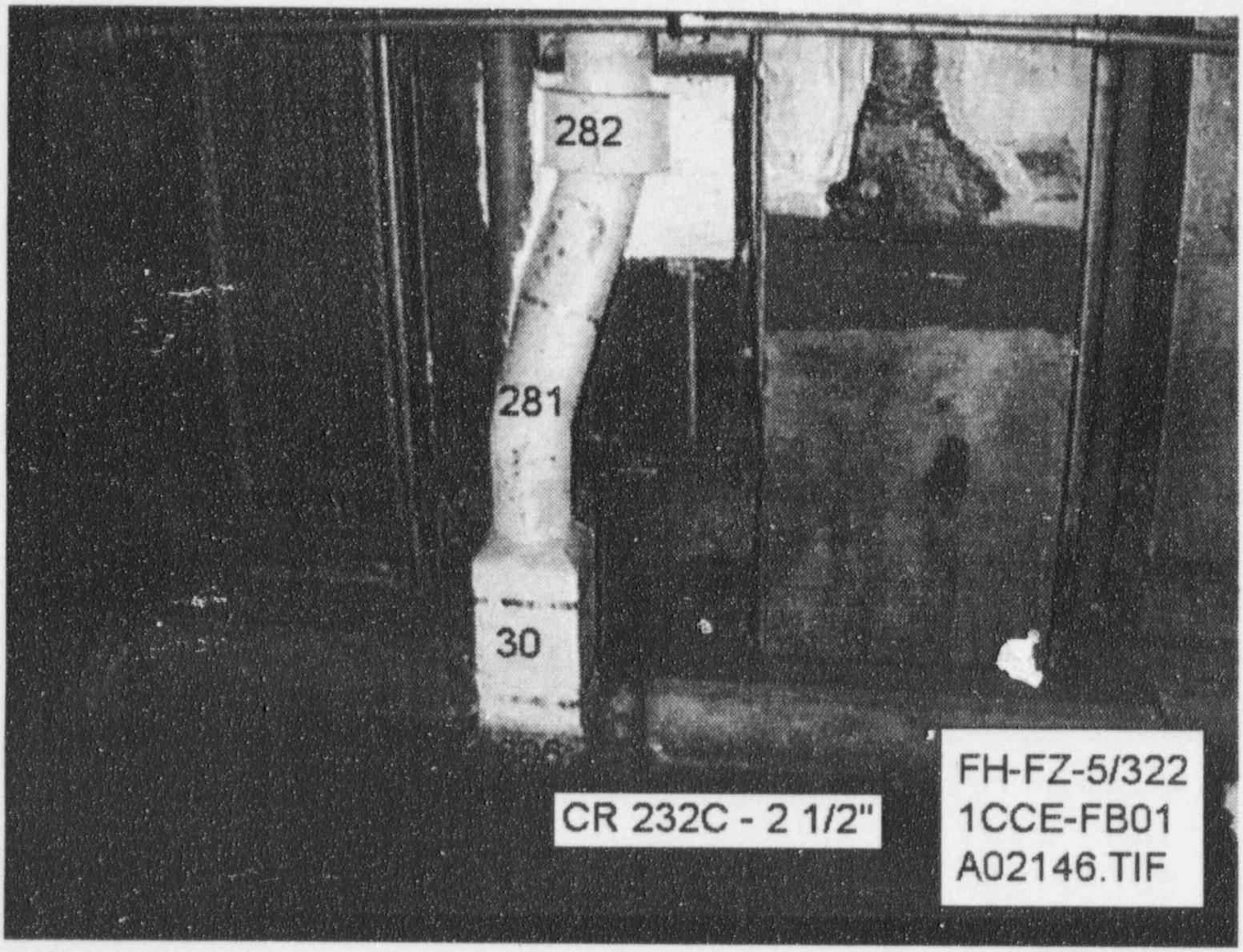
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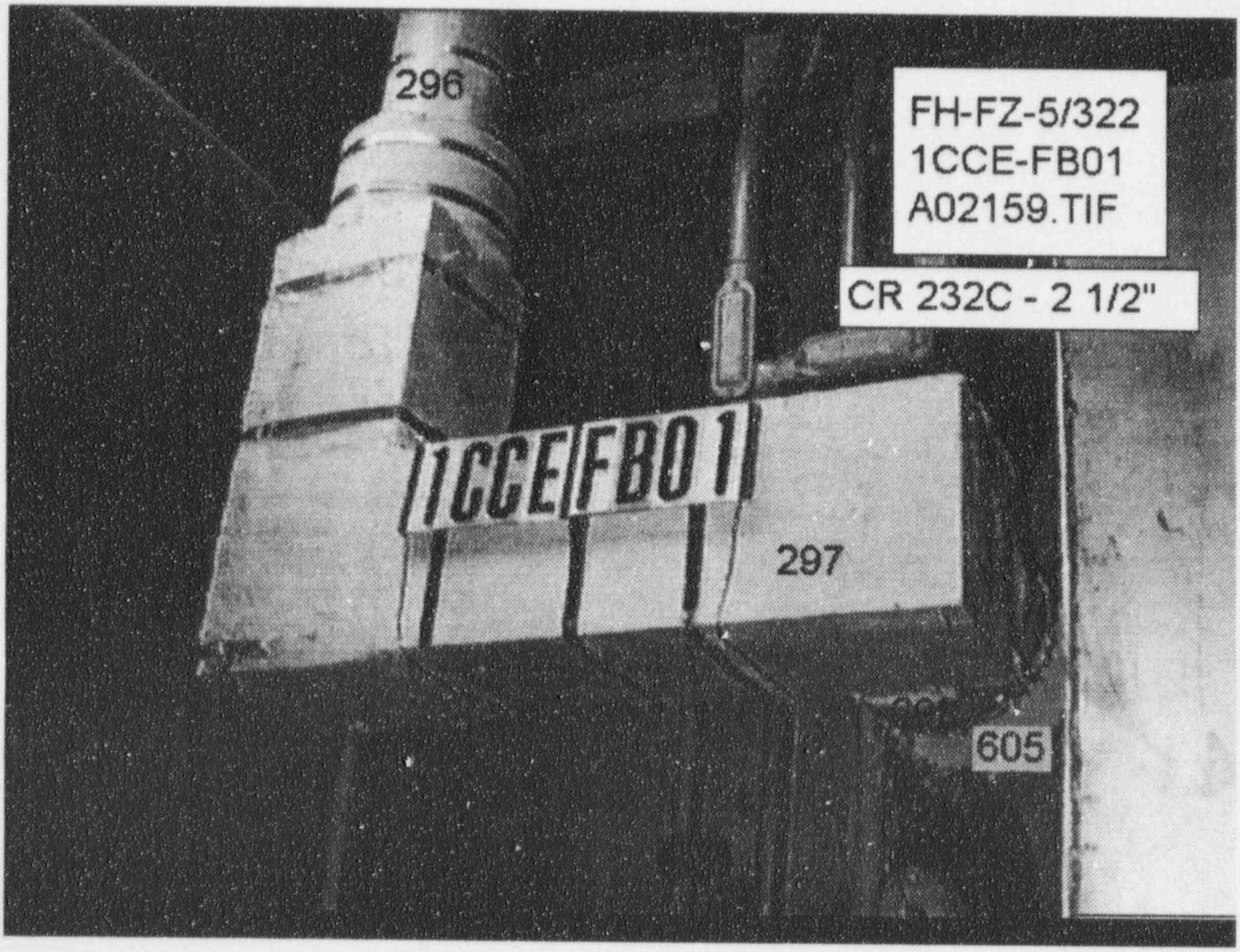
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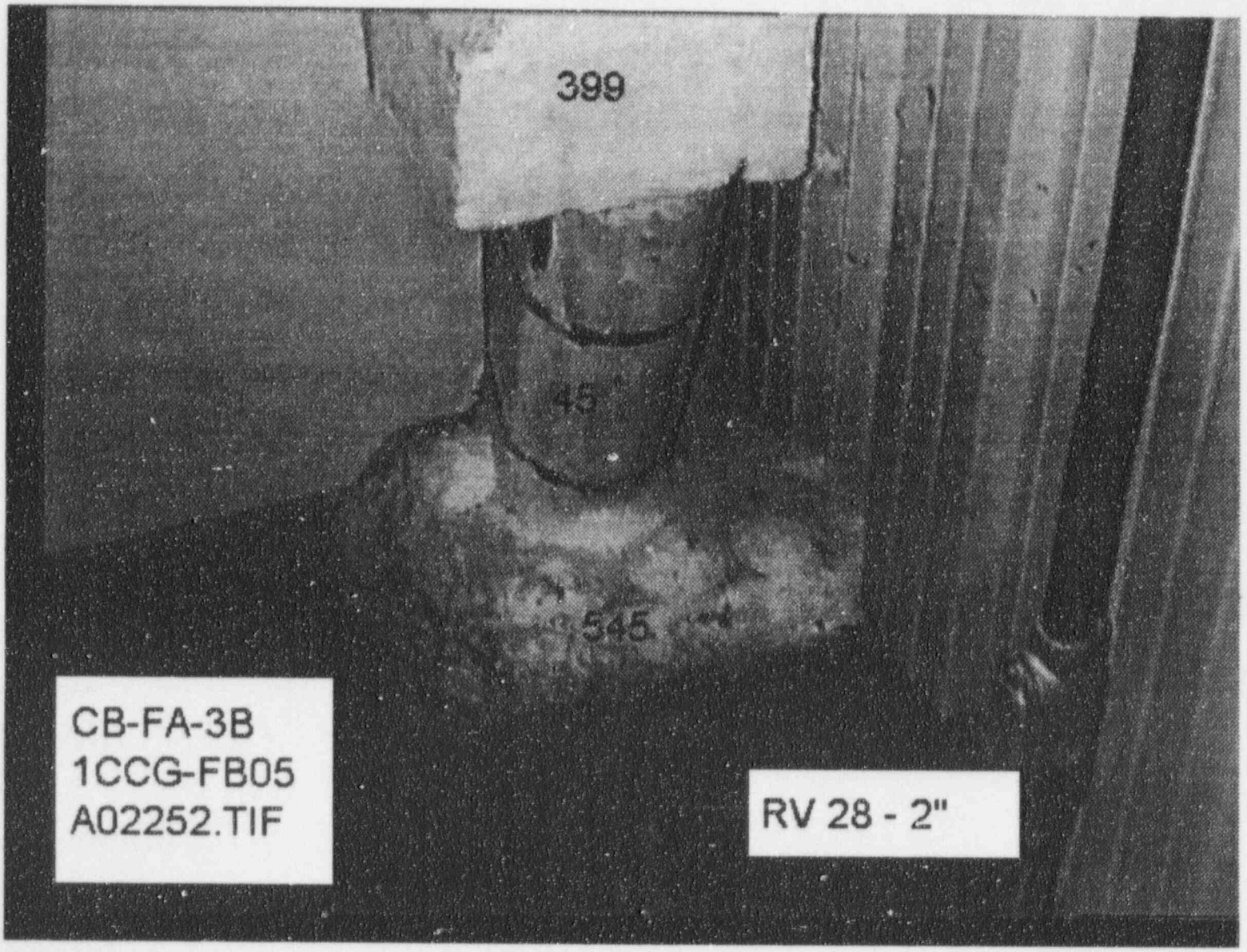
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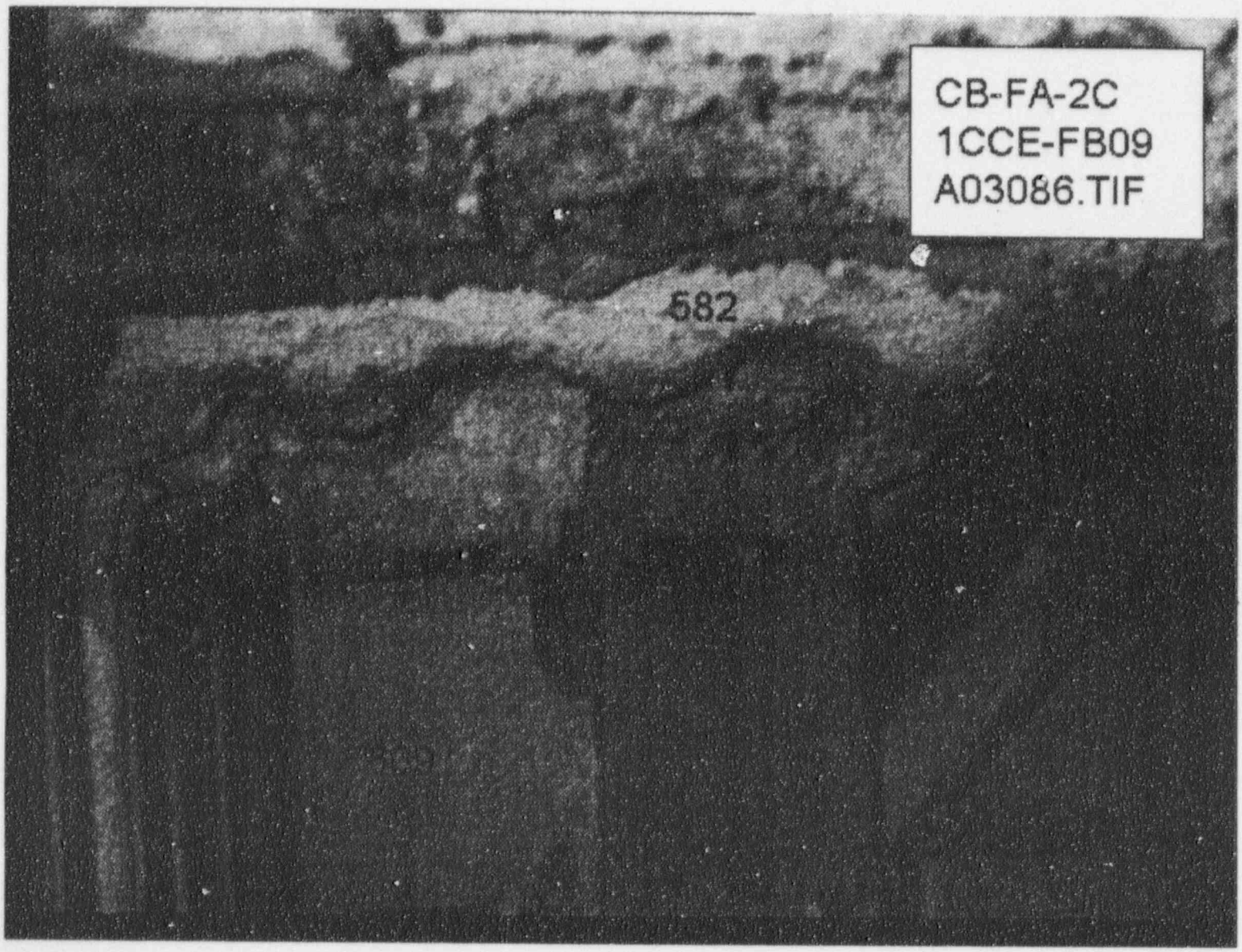
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ATTACHMENT

NRC Question:

8. For Elements 542 and 34, specific condulet dimensions are not given. Elements 352, 300, 314 and 30 are described as condulets with specific dimensions of height, length and width provided. Please clarify this inconsistency.

Response:

Reporting of condulet dimensions is corrected to specify the size of condulet protected rather than specifying the dimensions in terms of height, length and width. For example, Element 352 is a condulet installed on a 1-inch conduit raceway and is identified as 1 inch in size instead of 11.5" x 5.5" x 12.". All condulet element sizes are now identified consistent with Elements 542 and 34. This is consistent with condulet dimensions reported in the NEI Application Guide for comparison purposes.. The test reports document the actual barrier dimensions.

Based upon a clarification of this question in our conference call of December 4, 1996, the following discussion provides additional basis for the conclusion that the TMI-1 installed condulets are bounded by NEI Test 2-3. Specific condulet fire barrier dimensions were not obtained in all cases.

NEI Test 2-3 documents barrier dimensions for test assemblies as follows:

6-inch	11½" x 11½" x 45½"h (side 12½")	ref. Fig. 2-3, Sh. 6
3-inch	9¼" x 10" x 18¼"h (side 10¾")	ref. Fig. 2-3, Sh. 5
¾-inch	3½" x 4½" x 7¼"h (side 4½")	ref. Fig. 2-3, Sh. 4

As is the case in response to Question 3 for conduits, the larger the condulet enclosure, the higher the fire barrier rating. Condulet fire barriers could be rated higher than other barrier types within the same raceway, i.e., temperature data for a ¾-inch condulet in NEI Test 2-3 suggests that the condulet could be rated at 96 minutes based upon a single maximum reading on the condulet vs. 69 minutes. Where specific condulet fire barrier dimensions have been recorded, they are larger than the NEI test configuration to which they have been compared. The dimensions for same size condulet barriers are not identical; however, the dimensions are always larger than what has been tested thereby providing reasonable assurance that the barrier is bounded by the test to which they are compared.

ATTACHMENT

NRC Question:

9. Elements 578 and 350 do not have band spacing specified and the evaluations state that, "Additional inspection is required to determine the band spacing requirement." Provide results of these inspections and justify how these elements are bounded by the NEI tests to which these assemblies are being compared.

Response:

GPU Nuclear plans on installing additional bands, if necessary, on these particular elements if the requested exemption is granted. If the requested exemption is granted, then these configurations would not require an upgrade to a 3-hour fire rating and the additional bands would be necessary in order for these configurations to fully conform to the NEI tests to which they have been compared. Element 578 has been compared to NEI Test 3-2 because this element is the interface between the fire barrier envelope and the wall. A band would be installed within 2 inches of the wall interface if the exemption is granted. With the additional band, the element configuration would then fully conform to NEI Test 3-2 and would be rated at 60 minutes. If the element is required to be rated at 3 hours, the need for an additional band becomes unnecessary since an entirely different configuration from the one that is currently installed would be necessary. The same applies to Element 350 which is a radial bend tray. Additional bands would be installed to assure consistency (2 bands per mitered section) with those tested in NEI Test 2-10 if the exemption is granted. If not, a 3-hour rated configuration would require a substantial change or a complete rebuild to the existing barrier.