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**MATERIAL ANALYSIS REPORT**  
**TABLE 1, TESTS PERFORMED and RESULTS**  
(See Attachment #1 for Test/Equipment Specifications)

TEST	METHOD OR INSTRUMENT	PERFORMED BY	LOCATION, DATE	RESULTS LOCATION
VISUAL EXAMINATION	STANDARD FAILURE ANALYSIS	D. KLESCH	BETA, 2/27-3/1/2006	SEE SUMMARY
BULK CHEMICAL ANALYSIS	ARL-3460	M. TASCAR	BETA, 3/1/2006	SEE TABLE 2
HARDNESS	ROCKWELL	M. TASCAR	BETA, 3/1&2/2006	SEE TABLE 3
LINER "DEPOSIT/ SCALE" METALLOGRAPHIC SAMPLE CHEMICAL ANALYSIS VIA SEM-EDS	CAMSCAN	C. HOLP	BETA, 2/28/2006 AND 3/1-4/2006	SEE TABLE 4
LINER "SCALE" IN-SITU CHEMICAL ANALYSIS VIA SEM-EDS	CAMSCAN	C. HOLP	BETA, 3/1/2006	SEE TABLE 5
CONCRETE IN-SITU CHEMICAL ANALYSIS-SEM/EDS	CAMSCAN	C. HOLP	BETA, 3/1/2006	SEE TABLE 6
MICROSTRUCTURES	STANDARD METALLOGRAPHY	D. KLESCH	BETA, 3/1-4/2006	SEE SUMMARY
CHEMICAL ANALYSIS OF THE CONCRETE	PH AND ION CHROMATOGRAPHY	WATER LAB	BETA, 3/3/2006	ATTACHMENT #2

**TABLE 2, LINER SAMPLES, CHEMICAL ANALYSIS VIA VACUUM SPECTROMETRY- PERFORMED BY M. TASCAR.**

TEST SAMPLE	CHEMICAL COMPOSITION, WT. %											
	C	SI	S	P	MN	NI	CR	MO	V	CU	AL	TI
SAMPLE "A" PIECE	0.19	0.26	0.026	0.011	0.76	0.02	0.05	0.004	0.001	0.05	0.038	0.002
SAMPLE "B", Pc #1	0.19	0.26	0.025	0.011	0.76	0.02	0.05	0.004	0.002	0.05	0.038	0.002
SAMPLE "B", Pc #2	0.19	0.26	0.022	0.009	0.77	0.02	0.03	0.004	0.001	0.02	0.039	0.002
A516, GRADE 60^	0.21 MAX	0.13- 0.45	0.035 MAX	0.035 MAX	0.55- 0.98#	NS	NS	NS	NS	NS	NS	NS
SAMPLE "B" WELD**	0.03	0.43	0.029	0.010	1.21	0.02	0.03	0.003	0.022	0.01	0.003	0.008
E7018^^	NS	0.75 MAX	NS	NS	1.60 MAX§	0.30 MAX§	0.20 MAX§	0.30 MAX§	0.08 MAX§	NS	NS	NS

NOTES:

^FOR THE OLDEST AVAILABLE BASE METAL REFERENCE, SEE ASTM A516-90, STANDARD SPECIFICATION FOR PRESSURE VESSEL PLATES, CARBON STEEL, FOR MODERATE AND LOWER-TEMPERATURE SERVICE.

#GRADE 60 PLATES 1/2" THICK AND UNDER MAY HAVE 0.79-1.30% MN ON PRODUCT ANALYSIS.

\*\*GROUND AND TESTED FIVE (5) TIMES FOR AVERAGE.

^^FOR THE OLDEST AVAILABLE WELD METAL ONLY REFERENCE, SEE ASME SFA 5.1-1989, SPECIFICATION FOR COVERED CARBON STEEL ARC WELDING ELECTRODES.

§THE TOTAL OF THESE ELEMENTS SHALL NOT EXCEED 1.75%.

**TABLE 3, LINER SAMPLES, ROCKWELL "B" (HRB^ ) HARDNESS TESTS- PERFORMED BY M. TASCAR.**

TEST SAMPLE	#TESTS	MINIMUM	MAXIMUM	AVERAGE
PIECE OF "A" #11 QUADRANT*	7	73.8	75.4	74.6
PIECE OF "B" #10 QUADRANT*	7	71.3	72.7	71.9
PIECE OF "B" OTHER SIDE OF WELD	7	75.3	76.5	75.9

NOTES:

^SINCE NIST TRACEABLE ROCKWELL "B" TEST BLOCKS ARE NOT AVAILABLE, THESE DATA ARE "FOR INFORMATION ONLY".

\*FULL-SIZE SECTIONS TAKEN IN THE HORIZONTAL DIRECTION TESTED APPROXIMATELY AT MID-WALL.

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**TABLE 4, LINER METALLOGRAPHIC SECTIONS, CHEMICAL ANALYSIS VIA STANDARDLESS SEM-EDS\*-  
 PERFORMED BY C. HOLP.**

TEST SAMPLE <sup>^</sup>	FIGURE	CHEMICAL COMPOSITION, WT. %												
		O	NA	MG	AL	SI	S	K	CL	CA	TI	CR	MN	FE
"A", Q11-#3, PIT-1	29	23.3	ND	ND	ND	0.3	ND	ND	ND	0.3	ND	ND	0.3	76.6
"A", Q11-#3, PIT-2	29	19.0	ND	ND	ND	0.6	ND	ND	ND	ND	ND	ND	0.3	80.2
"A", Q11-#3, PIT-3	29	23.7	ND	ND	2.7	1.8	ND	ND	ND	0.5	ND	ND	1.2	70.0
"A", Q11-#5, "SCALE"	35	23.4	ND	ND	0.3	0.7	0.7	ND	ND	2.3	ND	ND	0.4	72.1
"A", Q11-#6, "SCALE"	36	15.9	ND	ND	ND	1.6	ND	ND	ND	0.4	ND	ND	0.5	81.7
"B", Q10-#3, PIT-1	32	ND	ND	ND	ND	0.4	ND	ND	ND	ND	ND	ND	0.6	99.0
"B", Q10-#3, PIT-2	32	18.3	ND	ND	0.9	0.6	ND	0.3	ND	0.2	ND	ND	0.4	79.2

NOTES: \*THE SAMPLES WERE REVIEWED UTILIZING SCANNING ELECTRON MICROSCOPY (SEM) AND ENERGY DISPERSIVE X-RAY SPECTROSCOPY (EDS). ANY QUANTITATION OF SPECTRA IS CALCULATED BY A STANDARDLESS EDS ANALYSIS PROGRAM. DUE TO THE NATURE OF THE TECHNIQUE ALL VALUES SHOULD BE CONSIDERED APPROXIMATIONS AND "FOR INFORMATION ONLY".

<sup>^</sup>METALLOGRAPHIC SECTIONS, AS-POLISHED WITH ALUMINUM OXIDE.

ND = NOT DETECTED.

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**TABLE 5, IN-SITU LINER OD SURFACE CHEMICAL ANALYSIS VIA STANDARDLESS SEM-EDS\*-**  
 PERFORMED BY C. HOLP.

TEST SAMPLE <sup>^</sup>	FIGURE	CHEMICAL COMPOSITION, WT. %													
		O	NA	MG	AL	SI	S	K	CL	CA	TI	CR	MN	FE	ZN
PIT <sup>^^</sup>	10	32.1	ND	0.4	0.8	2.9	2.9	ND	ND	24.0	ND	ND	0.4	39.2	ND
DARK SURFACE <sup>^^</sup>	10	34.4	ND	2.2	0.6	3.7	0.2	ND	0.2	26.4	0.2	ND	0.4	31.7	ND
RED/ORANGE SURFACE <sup>^^</sup>	10	23.7	ND	1.0	0.6	2.0	0.3	ND	0.3	13.4	ND	0.1	0.4	58.2	ND
BROWN SURFACE <sup>#</sup>	37, 38	26.6	ND	ND	0.5	1.4	0.2	ND	ND	5.9	ND	ND	0.6	64.4	0.4
WHITE SURFACE <sup>#</sup>	37, 39	4.2	ND	ND	0.2	0.7	ND	ND	ND	0.2	ND	ND	0.5	94.2	ND

NOTES: \*THE SAMPLES WERE REVIEWED UTILIZING SCANNING ELECTRON MICROSCOPY (SEM) AND ENERGY DISPERSIVE X-RAY SPECTROSCOPY (EDS). ANY QUANTITATION OF SPECTRA IS CALCULATED BY A STANDARDLESS EDS ANALYSIS PROGRAM. DUE TO THE NATURE OF THE TECHNIQUE ALL VALUES SHOULD BE CONSIDERED APPROXIMATIONS AND "FOR INFORMATION ONLY".

<sup>^</sup>SAMPLE "A", QUADRANT 11 (Q11).

<sup>^^</sup>INTACT PIECE OF THE LINER AS-RECEIVED.

<sup>#</sup>ULTRASONICALLY CLEANED IN DEIONIZED WATER AND LIGHTLY SCRUBBED WITH A SOFT BRUSH.

ND = NOT DETECTED.

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**TABLE 6, CONCRETE SURFACE CHEMICAL ANALYSIS VIA STANDARDLESS SEM-EDS\*-**  
 PERFORMED BY C. HOLP.

TEST SAMPLE <sup>^</sup>	FIGURE	CHEMICAL COMPOSITION, WT. %												
		O	NA	Mg	AL	SI	S	K	CL	CA	TI	CR	MN	FE
PC #1, AREA "A"	44	34.9	0.3	0.9	5.1	24.7	0.3	0.8	ND	20.2	0.2	ND	ND	5.1
PC #2, AREA "B"	46	33.2	0.4	0.8	5.1	33.8	0.4	0.8	ND	20.2	0.2	ND	ND	5.1
SPECIAL SAMPLE #1 <sup>^^</sup>	49	41.0	ND	1.0	2.2	13.6	0.4	0.2	0.1	38.5	ND	ND	ND	2.9

NOTES: \*THE SAMPLES WERE REVIEWED UTILIZING SCANNING ELECTRON MICROSCOPY (SEM) AND ENERGY DISPERSIVE X-RAY SPECTROSCOPY (EDS). ANY QUANTITATION OF SPECTRA IS CALCULATED BY A STANDARDLESS EDS ANALYSIS PROGRAM. DUE TO THE NATURE OF THE TECHNIQUE ALL VALUES SHOULD BE CONSIDERED APPROXIMATIONS AND "FOR INFORMATION ONLY".

<sup>^</sup>SMALL SAMPLES BROKEN OFF OF EACH PIECE AND SURFACE GROUND FOR ANALYSIS.

<sup>^^</sup>FLAT SURFACE, BROKEN FROM THE LARGE SAMPLE (#1), THAT WAS REPORTEDLY "FOAM-CLEANED" TO ALLOW RELEASE FROM PLANT, AND TESTED AS-IS.

ND = NOT DETECTED.

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**FIGURE 1, AS-FOUND LINER APPEARANCE IN-SITU IN THE PLANT, COURTESY OF PLANT PERSONNEL. AREA #1 IS AT THE LEFT; AREA #2 AT THE RIGHT.**

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**FIGURE 2A, LINER AREA #1-1, OVERVIEW IN-SITU IN THE PLANT, COURTESY OF PLANT PERSONNEL.**

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**FIGURE 2B, LINER AREA #1-2, CLOSER-VIEW, IN-SITU IN THE PLANT, COURTESY OF PLANT PERSONNEL.**

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**FIGURE 2C, LINER AREA #1-3, DETAIL, IN-SITU IN THE PLANT, COURTESY OF PLANT PERSONNEL.**

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**FIGURE 3A, LINER AREA #2-1, OVERVIEW IN-SITU IN THE PLANT, COURTESY OF PLANT PERSONNEL.**

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**FIGURE 3B, LINER AREA #2-2, CLOSER-VIEW, IN-SITU IN THE PLANT, COURTESY OF PLANT PERSONNEL.**

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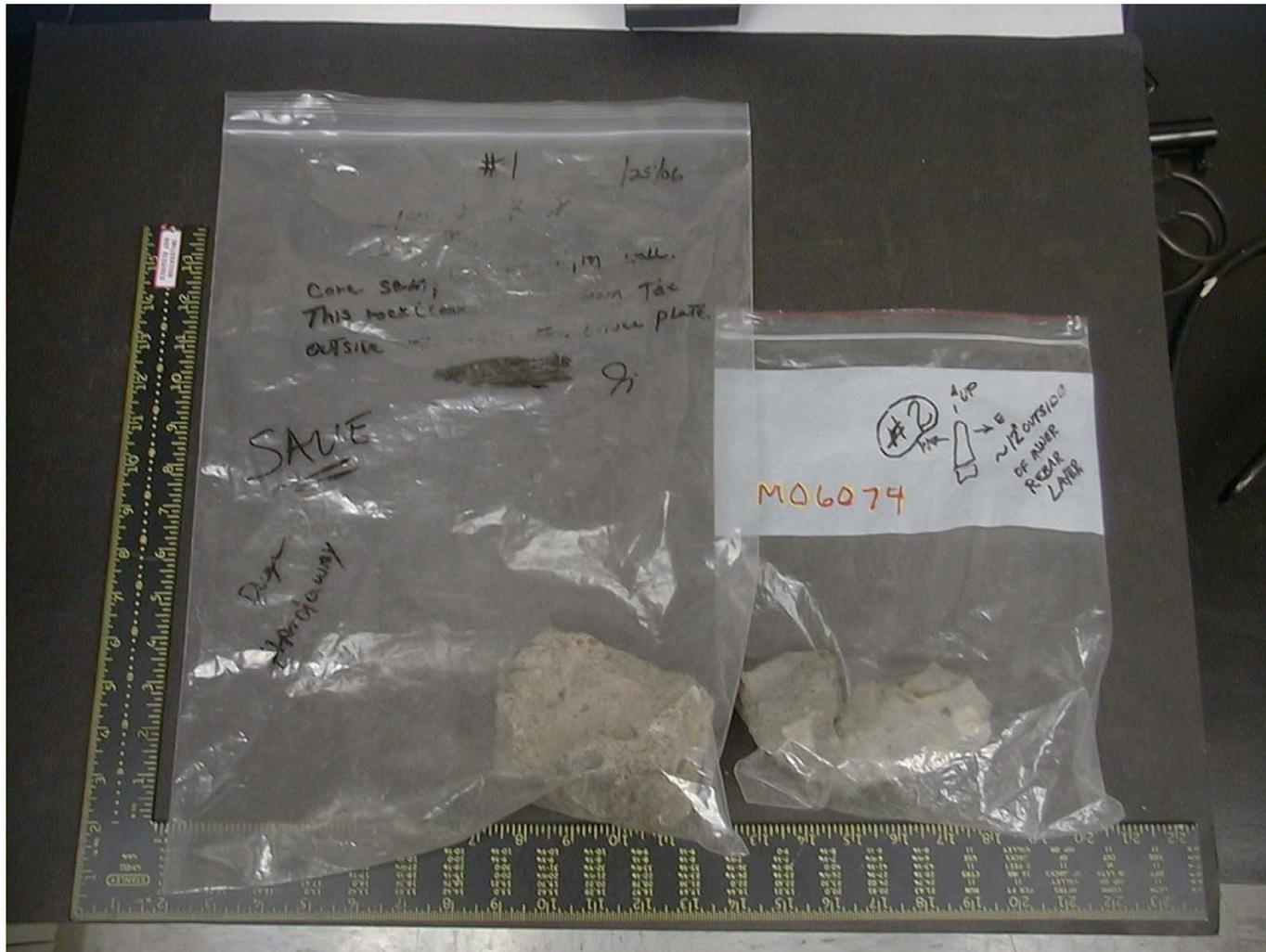


FIGURE 4, CONCRETE SAMPLE PIECES.

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**FIGURE 5A, LARGER CONCRETE SAMPLE PIECE (BAG-MARKED #1), “FLAT” FACE.**  
 THIS SURFACE IS THOUGHT TO REPRESENT THE CONTACT AREA WITH THE LINER PLATE.  
 NOTE: REPORTEDLY, THIS SAMPLE HAD TO BE FOAM-CLEANED TO BE RELEASED FROM THE PLANT.

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**FIGURE 5B, LARGER CONCRETE SAMPLE PIECE (BAG-MARKED #1), “ROUGH” FACE.**

THIS SURFACE IS THOUGHT TO AT OR NEAR THE INNER-MOST COURSE OF RE-BAR.

NOTES: THE SAMPLE IS RESTING ON THE “FLAT” FACE.

REPORTEDLY, THIS SAMPLE HAD TO BE FOAM-CLEANED TO BE RELEASED FROM THE PLANT.

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**FIGURE 5C, LARGER CONCRETE SAMPLE PIECE (BAG-MARKED #1), SIDE 1.**

NOTES: THE FLAT FACE IS SEEN AT THE BOTTOM IN THIS VIEW.

REPORTEDLY, THIS SAMPLE HAD TO BE FOAM-CLEANED TO BE RELEASED FROM THE PLANT.

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**FIGURE 5D, LARGER CONCRETE SAMPLE PIECE (BAG-MARKED #1), SIDE 2.**

NOTES: THE FLAT FACE IS AT THE BOTTOM IN THIS VIEW.

REPORTEDLY, THIS SAMPLE HAD TO BE FOAM-CLEANED TO BE RELEASED FROM THE PLANT.

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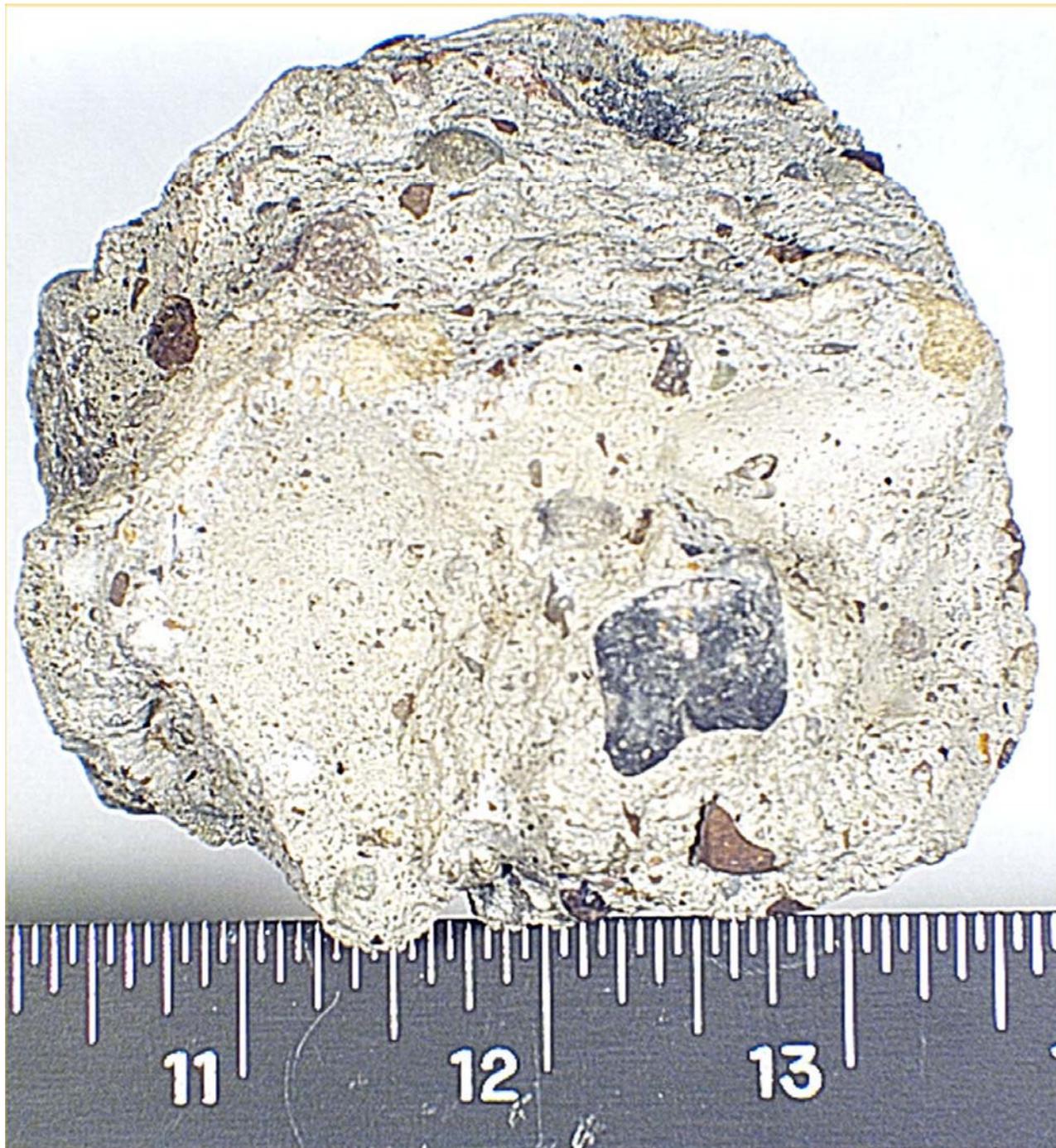


**FIGURE 5E, LARGER CONCRETE SAMPLE PIECE (BAG-MARKED #1), END 1.**

NOTES: REPORTEDLY, THIS SAMPLE HAD TO BE FOAM-CLEANED TO BE RELEASED FROM THE PLANT.

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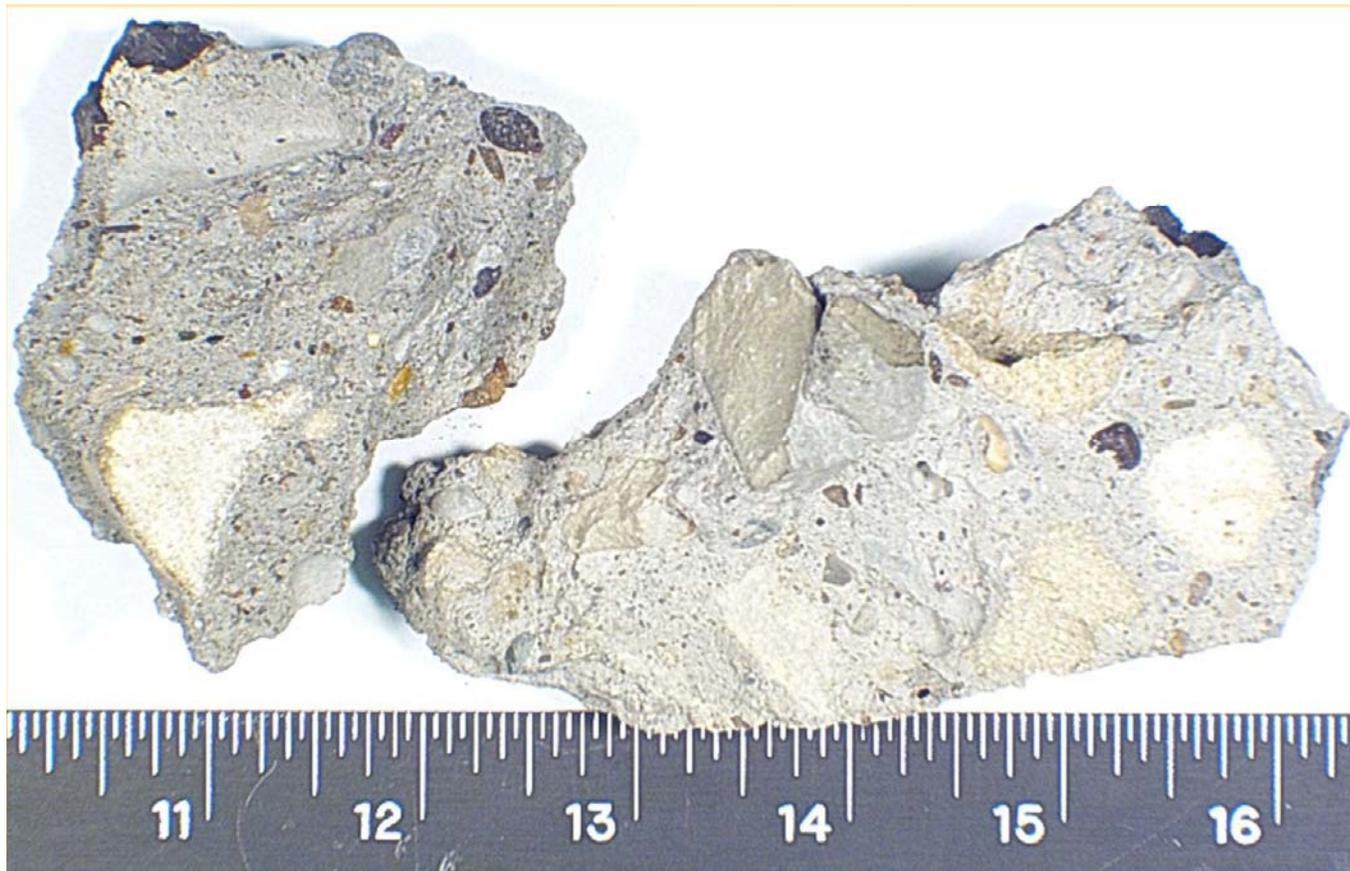


**FIGURE 5F, LARGER CONCRETE SAMPLE PIECE (BAG-MARKED #1), END 2.**

NOTES: REPORTEDLY, THIS SAMPLE HAD TO BE FOAM-CLEANED TO BE RELEASED FROM THE PLANT.

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**FIGURE 6A, SMALLER CONCRETE SAMPLE PIECES (BAG-MARKED #2), SIDE 1.**  
REPORTEDLY, REMOVED FROM ~12" FROM THE INNER REBAR LAYER.

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**FIGURE 6B, SMALLER CONCRETE SAMPLE PIECES (BAG-MARKED #2), SIDE 2.**  
REPORTEDLY, REMOVED FROM ~12" FROM THE INNER REBAR LAYER.

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**FIGURE 7, LARGER CONCRETE SAMPLE PIECE (BAG-MARKED #1), "FLAT" FACE DETAIL.**  
 THIS SURFACE IS THOUGHT TO REPRESENT THE CONTACT AREA WITH THE LINER PLATE, CONTAINS SEVERAL  
 SMOOTH AND CLEAN SPHEROIDAL VOIDS, THE LARGEST SEEN HERE ~1/8" Ø.

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**A. IN-SITU IMAGE.**

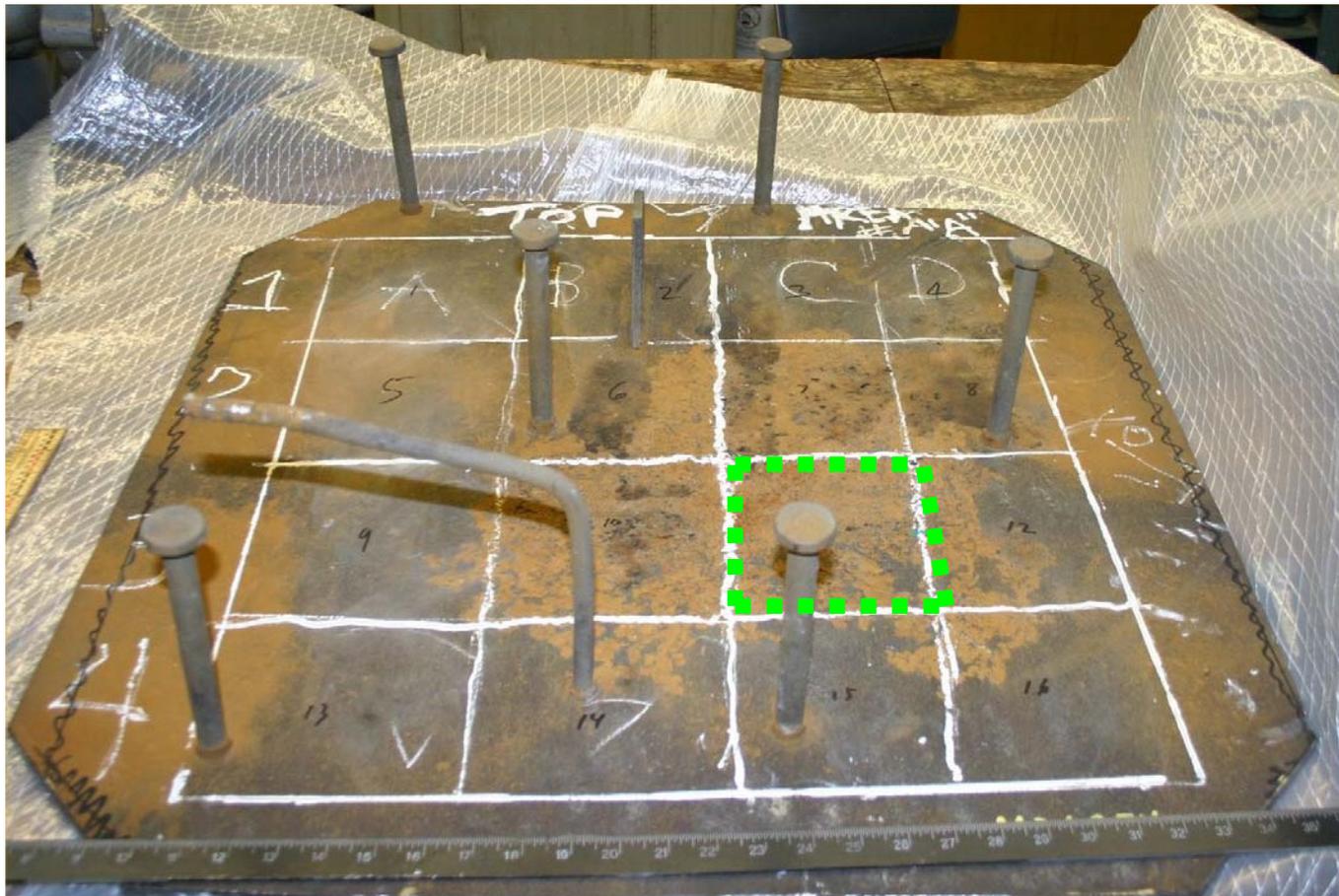


**B. AS-RECEIVED SAMPLE.**

**FIGURE 8(A&B), LINER SAMPLE "A", EXTERNAL OVERVIEWS.**  
THIS SAMPLE APPEARS TO CORRESPOND TO THE AREA 1 IN THE IN-SITU IMAGE.

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**FIGURE 8C, LINER SAMPLE “A”, EXTERNAL OVERVIEW AS-RECEIVED;  
QUADRANTS (#1-16) MARKED FOR TRACKING AT BETA.**

**NOTE: QUADRANT #11 WAS EXTRACTED VIA SECTIONING, APPROXIMATELY, AS-MARKED.**

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**A. IN-SITU IMAGE.**

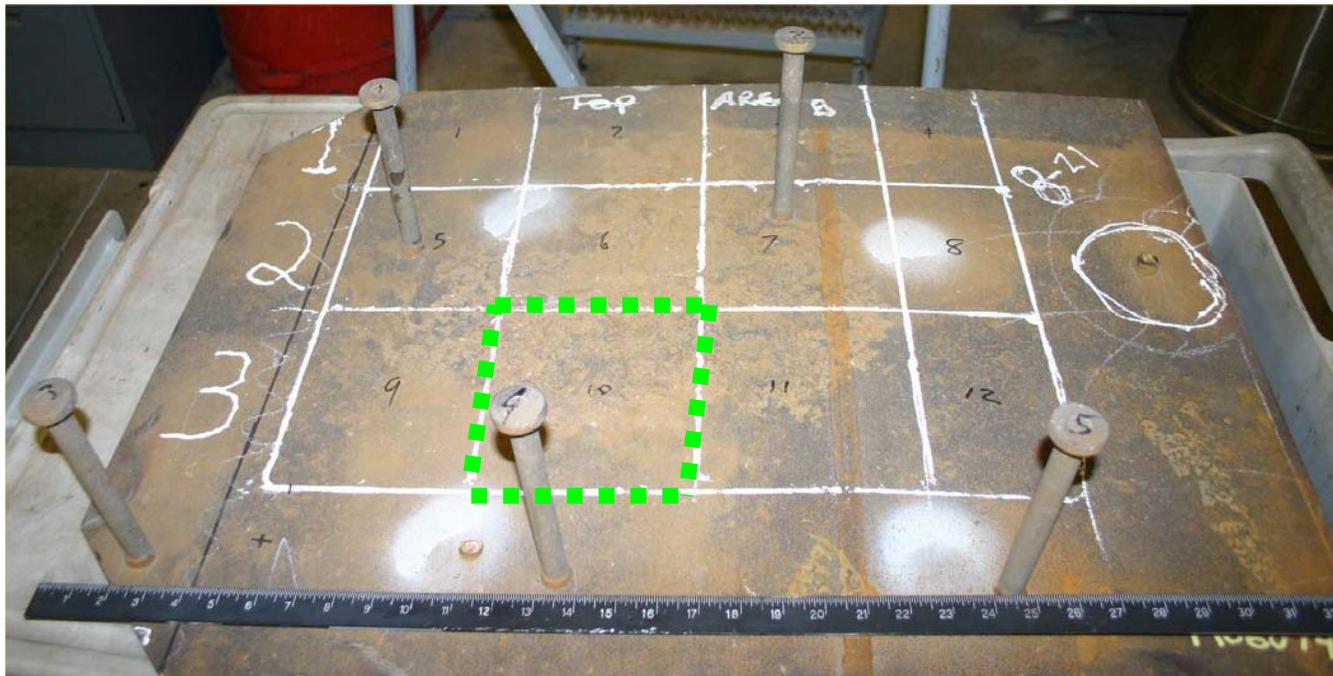


**B. AS-RECEIVED SAMPLE.**

**FIGURE 9(A&B), LINER SAMPLE "B", EXTERNAL OVERVIEWS.**  
THIS SAMPLE APPEARS TO CORRESPOND TO AREA 2 IN THE IN-SITU PLANT IMAGE.

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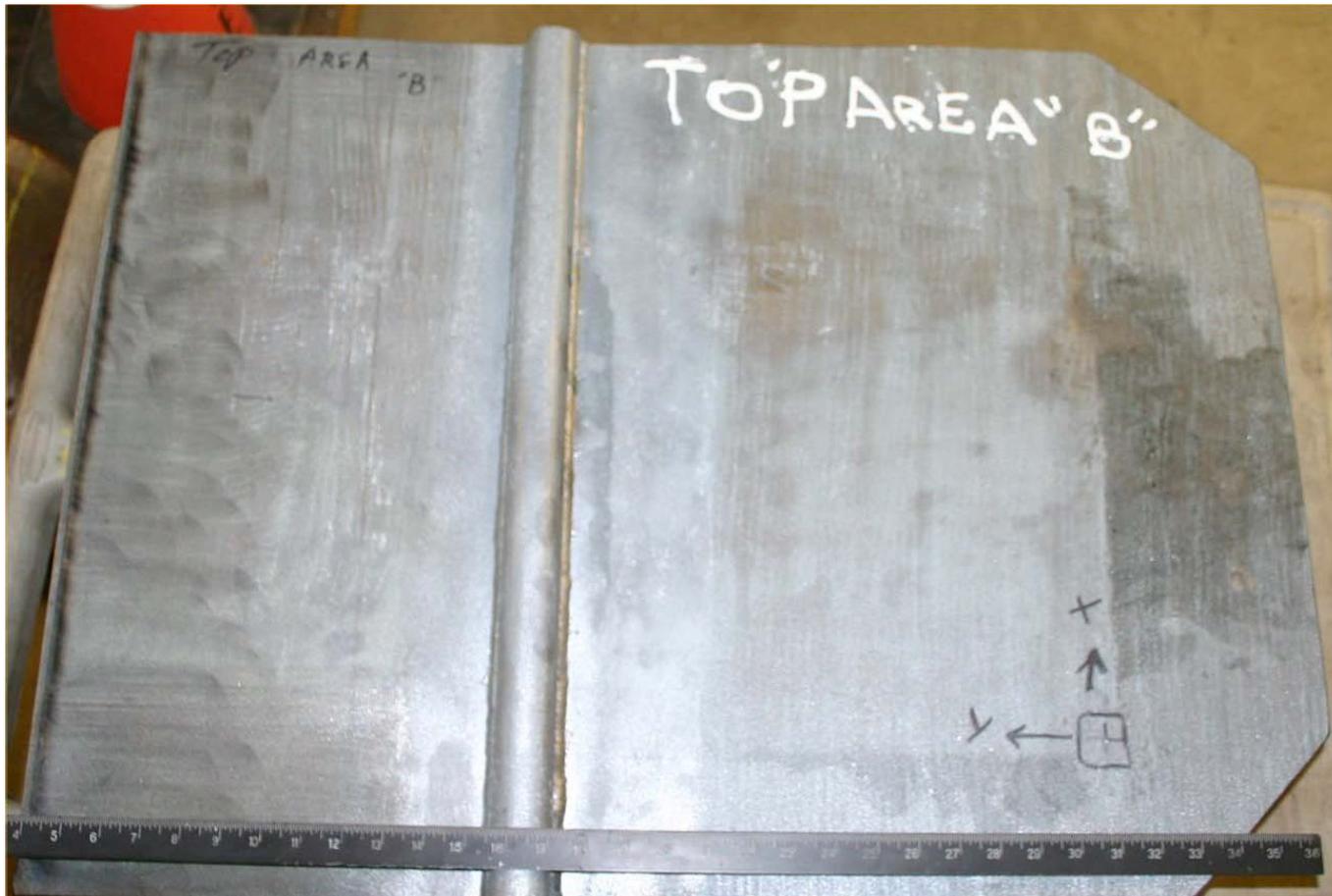


**FIGURE 9C, LINER SAMPLE "B", EXTERNAL OVERVIEW AS-RECEIVED;  
QUADRANTS (#1-12) MARKED FOR TRACKING AT BETA.**

NOTE: QUADRANT #10 WAS EXTRACTED VIA SECTIONING, APPROXIMATELY, AS-MARKED.

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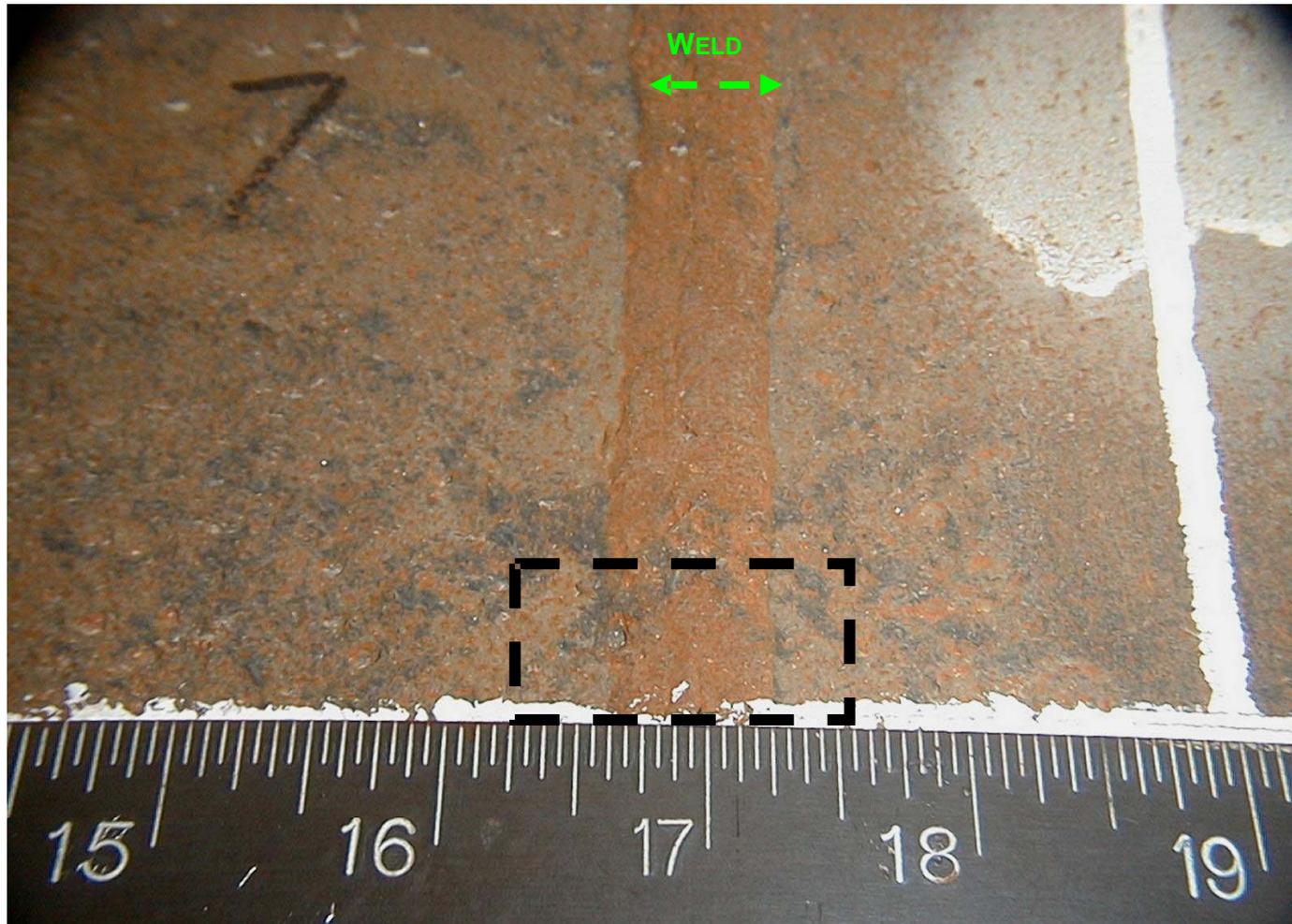
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**FIGURE 9D, LINER SAMPLE "B", INTERNAL OVERVIEW, AS-RECEIVED AT BETA.  
THE LINER WELD PRESSURE TEST CHANNEL IS EVIDENT.**

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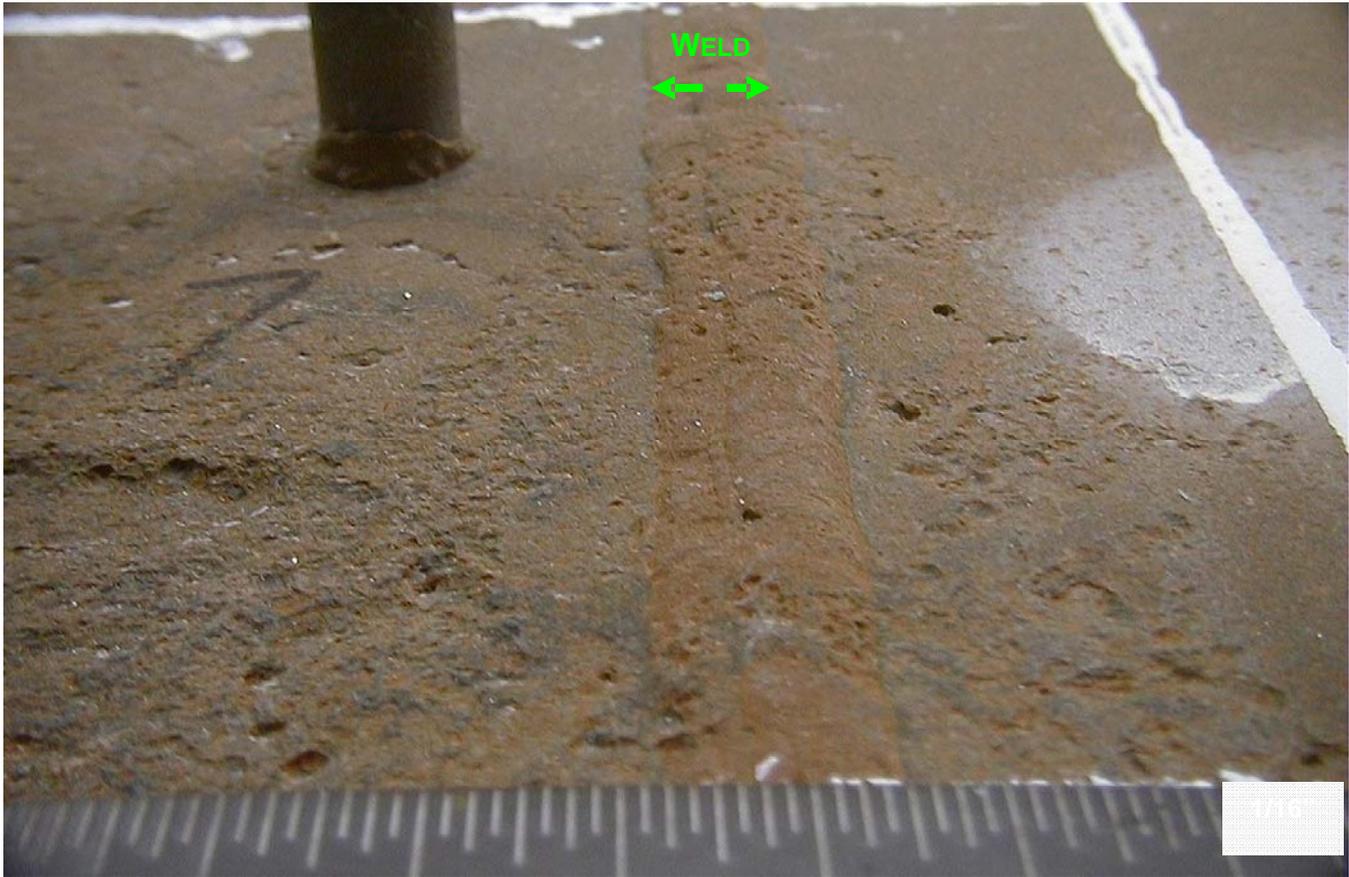
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**FIGURE 9E, LINER SAMPLE "B", WELD EXTERNAL CORROSION AREA, AS-RECEIVED AT BETA.  
SECTIONED, APPROXIMATELY AS-MARKED, FOR STUDY.  
NOTE: THE SURFACE CORROSION DISTRESS INCLUDES THE WELD SURFACES.**

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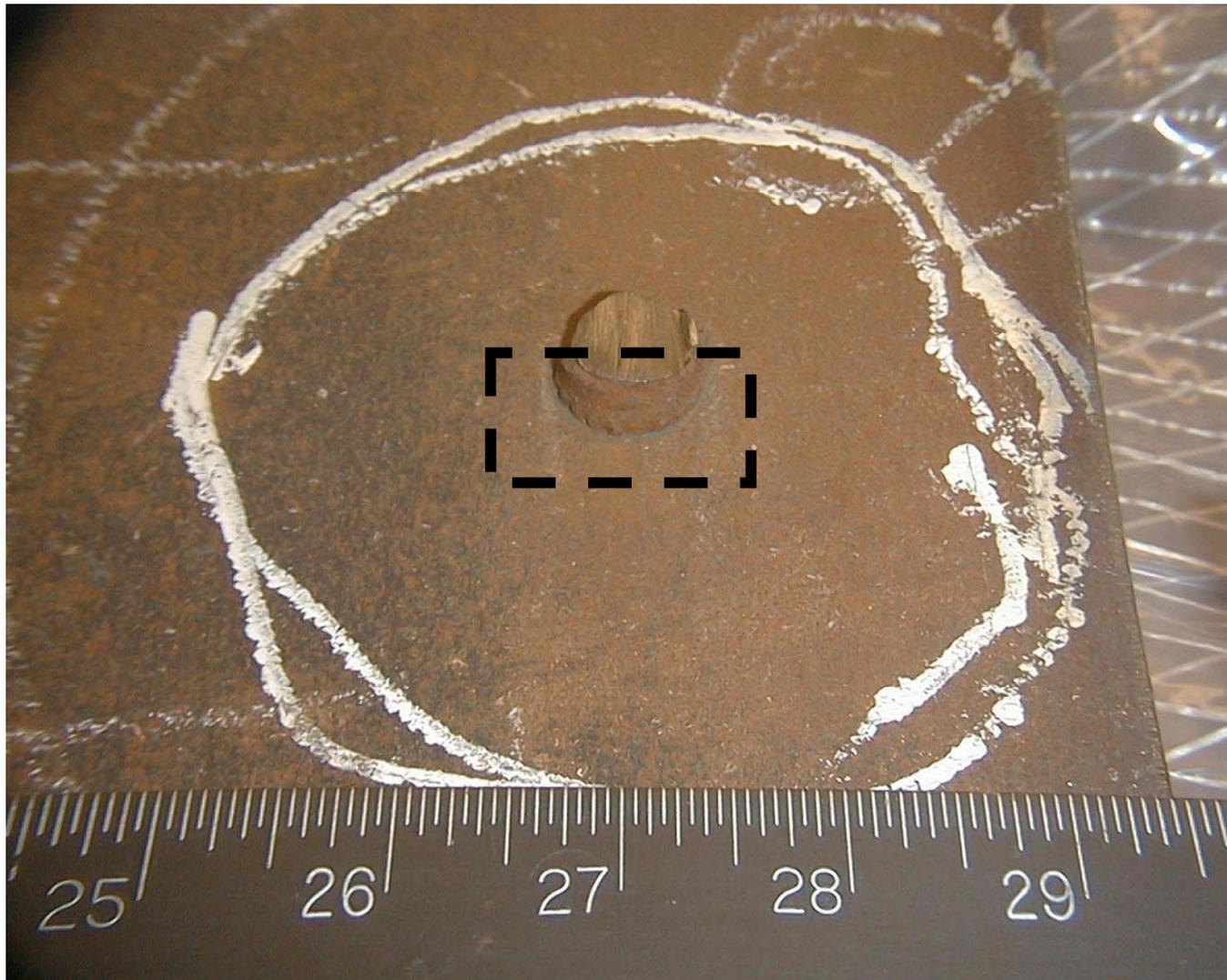
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**FIGURE 9F, LINER SAMPLE “B”, WELD EXTERNAL CORROSION AREA DETAIL, AS-RECEIVED AT BETA.**  
 THIS IS AN OBLIQUE VIEW, WITHOUT A FLASH, DIGITALLY AUGMENTED FOR IMPROVED CONTRAST.  
 NOTE: THE SURFACE CORROSION DISTRESS INCLUDES THE WELD SURFACES.

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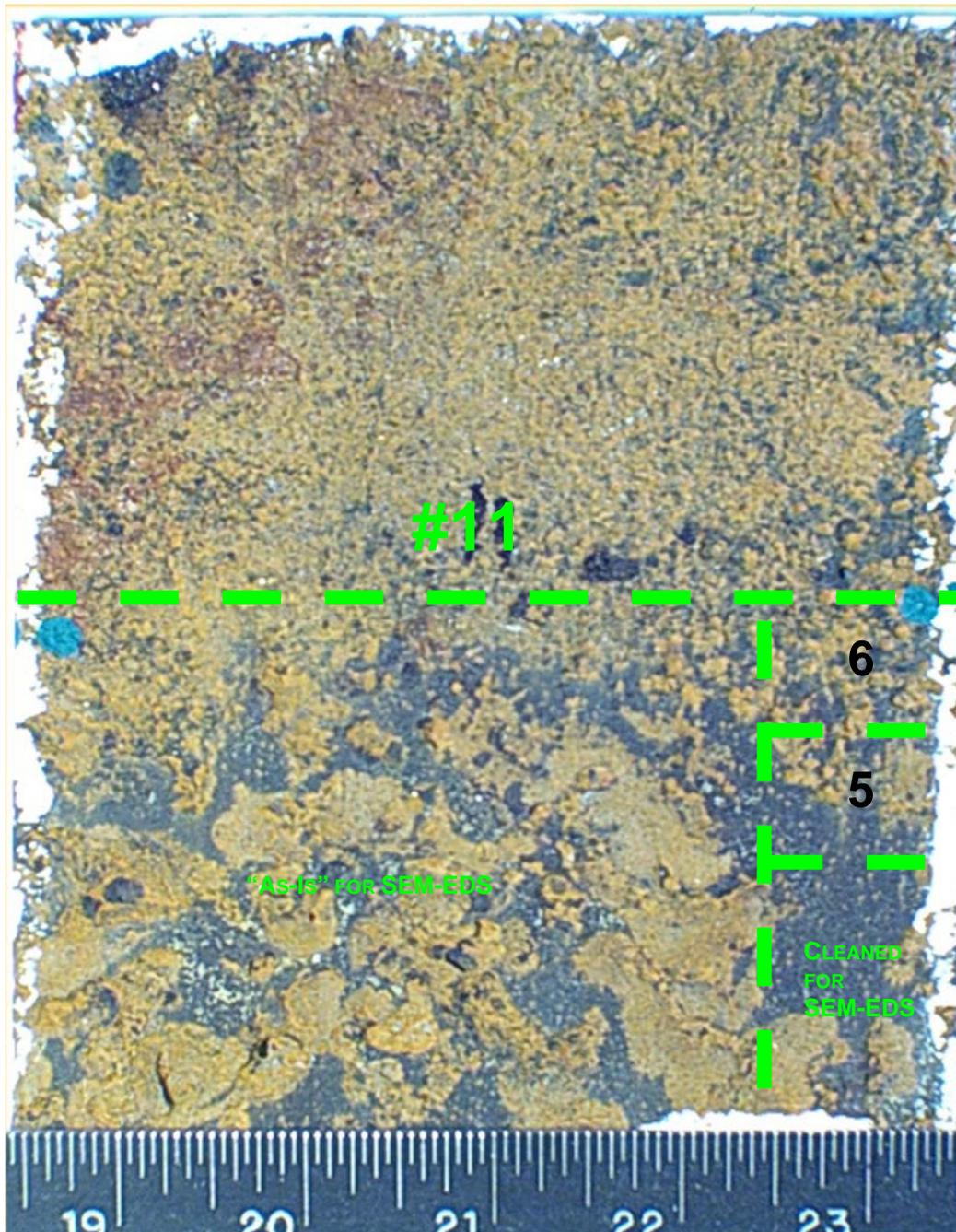
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**FIGURE 9G, LINER SAMPLE "B", STUD-WELD SAMPLE AREA DETAIL, AS-RECEIVED AT BETA.  
THE STUD-WELD HAD ALREADY BEEN REMOVED BY OTHERS.  
SECTIONED, APPROXIMATELY AS-MARKED, FOR STUDY.**

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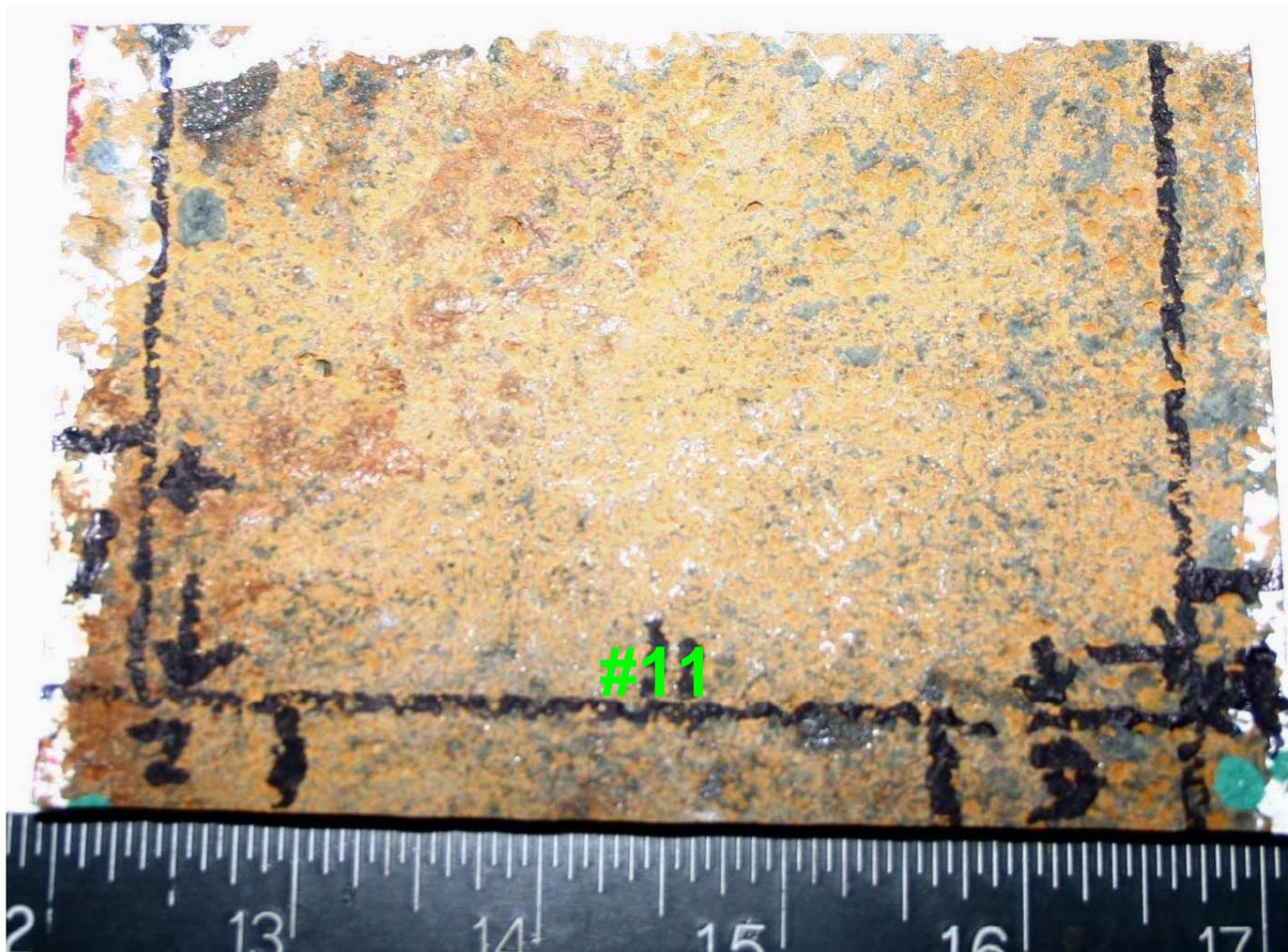


**2<sup>ND</sup> SET OF  
SECTIONS FOR  
METALLOGRAPHY**

**FIGURE 10, LINER SAMPLE "A", EXTRACTED GRID QUADRANT #11 PIECE;  
SEM AND 2<sup>ND</sup> SET OF METALLOGRAPHY SECTIONS.**  
SURFACES, VARYING FROM ROUGH TO SMOOTH, ARE SEEN.  
THIS PIECE WAS SECTIONED, APPROXIMATELY AS-MARKED, FOR FURTHER STUDY.

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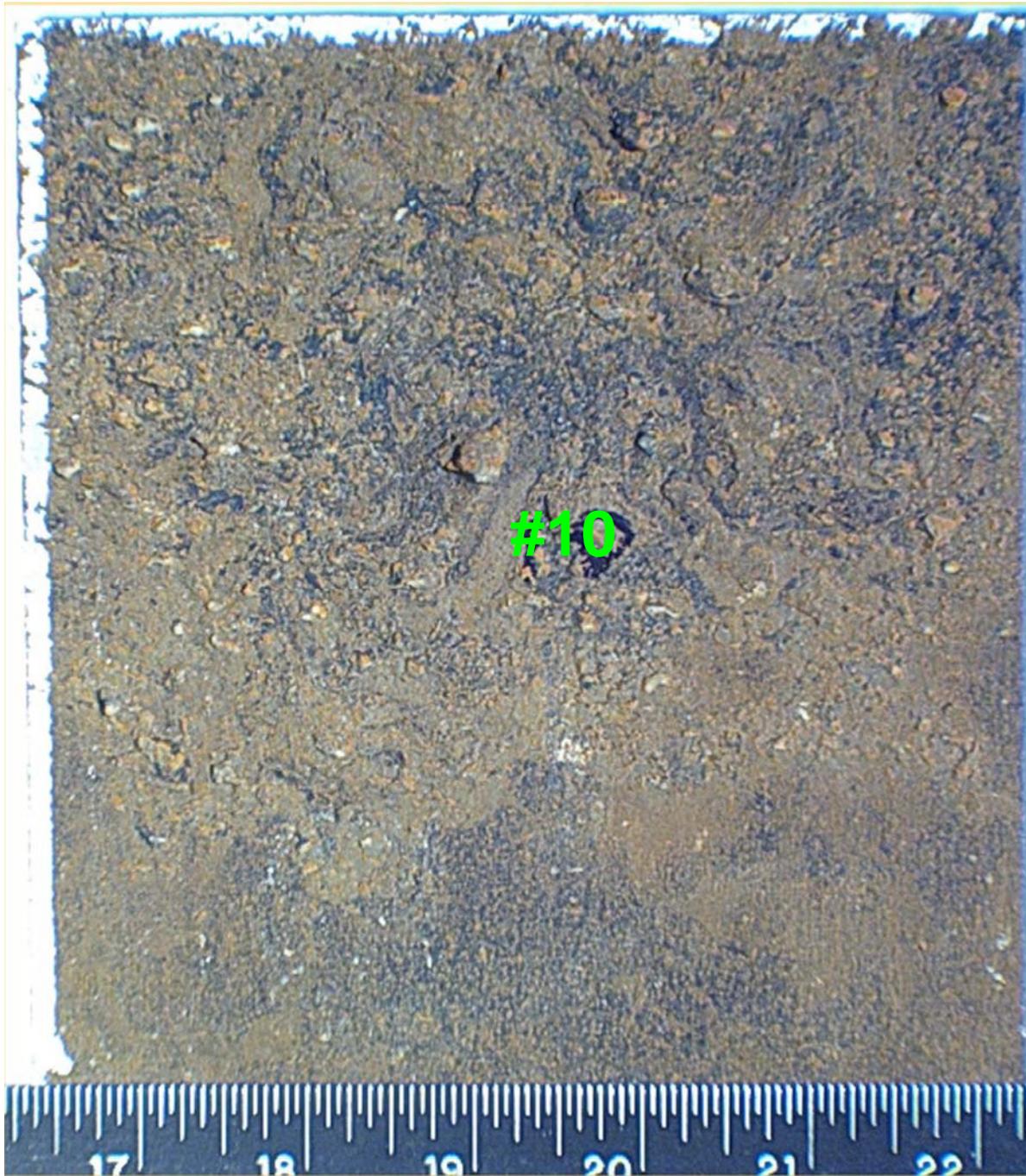
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**FIGURE 11, LINER SAMPLE "A", EXTRACTED GRID QUADRANT #11 PIECE;  
1ST SET OF METALLOGRAPHY SECTIONS**

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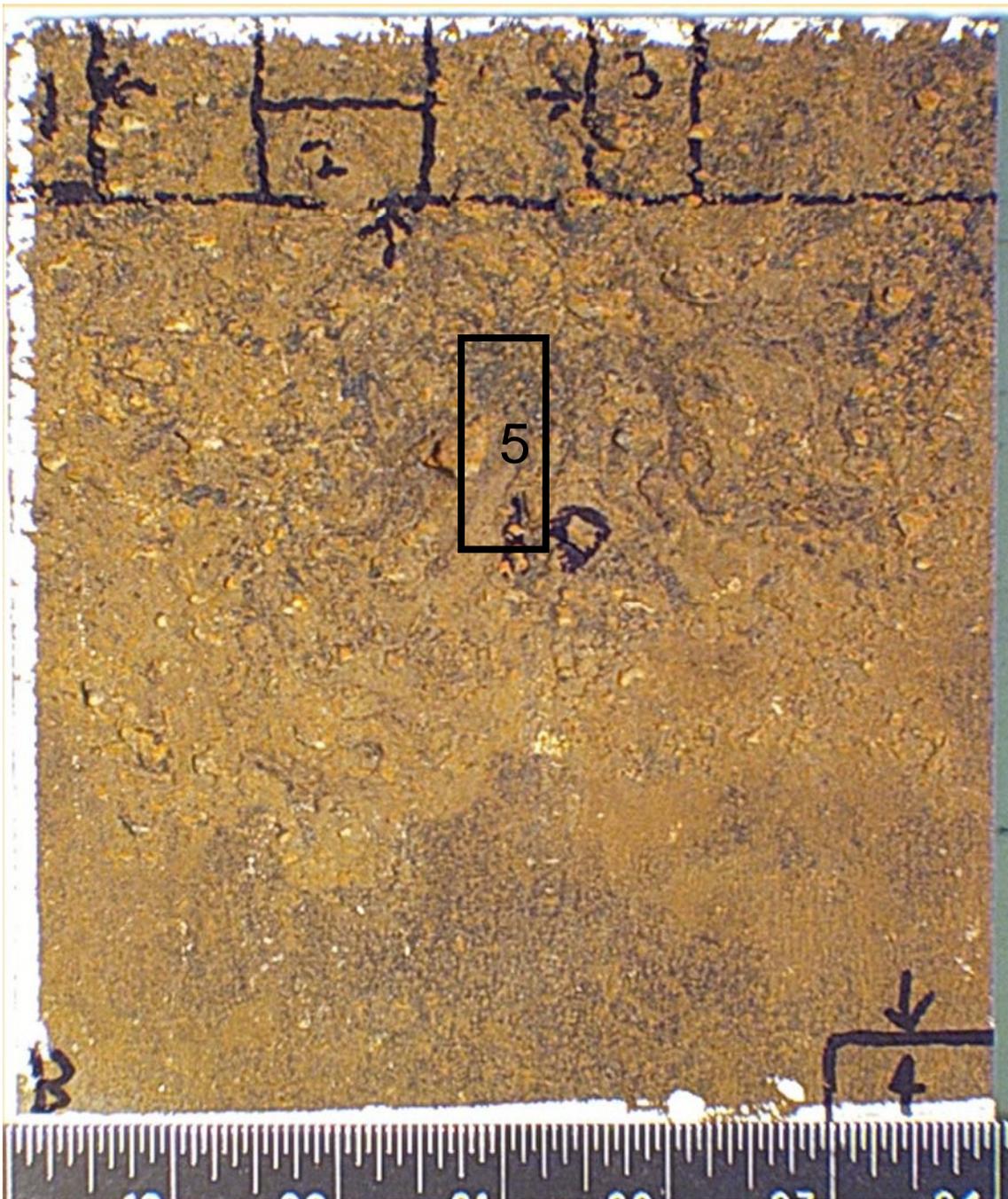
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**FIGURE 12, LINER SAMPLE "B", EXTRACTED GRID QUADRANT #10 PIECE, AS-FOUND.  
SURFACES, VARYING FROM ROUGH TO SMOOTH, ARE SEEN.**

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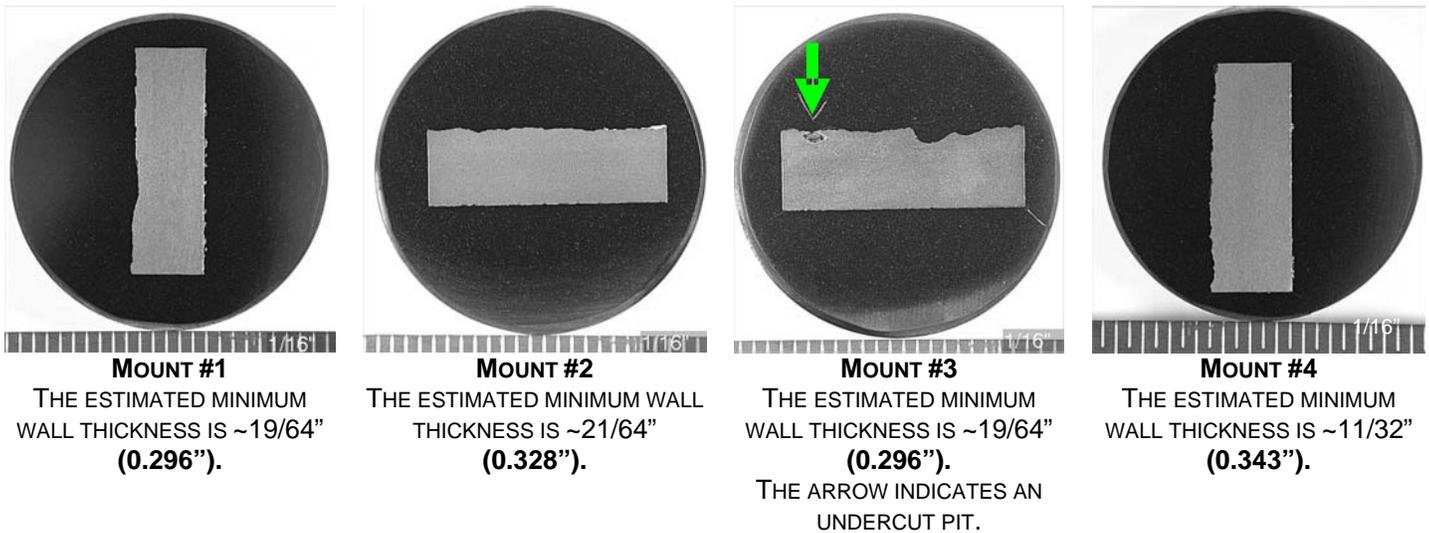
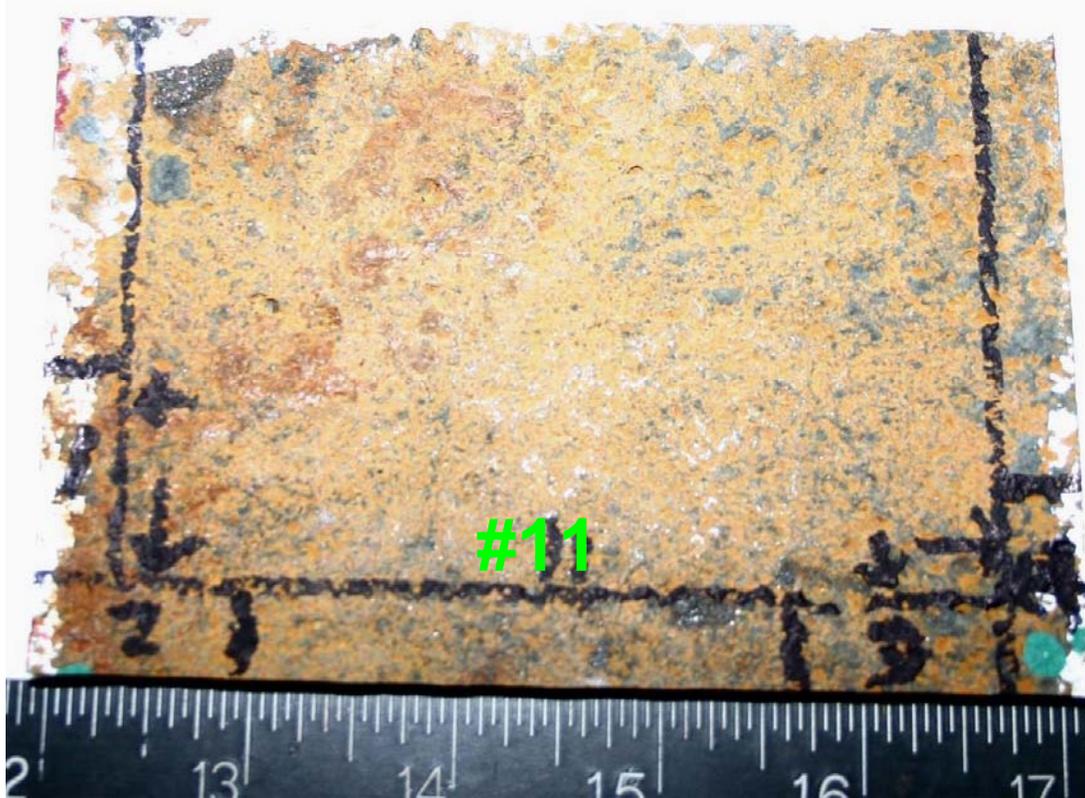
**MATERIAL ANALYSIS REPORT**



**FIGURE 13, LINER SAMPLE "B", EXTRACTED GRID QUADRANT #10;  
1<sup>ST</sup> SET OF METALLOGRAPHY SECTIONS.  
SECTIONED, APPROXIMATELY AS-MARKED, FOR FURTHER STUDY.**

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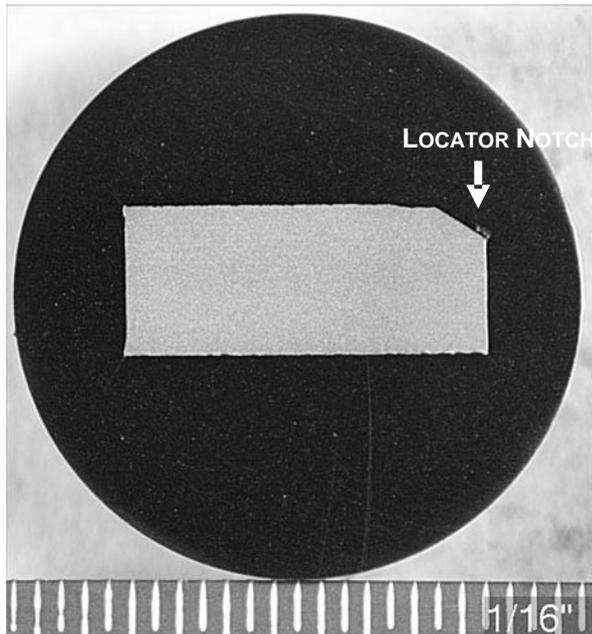
**MATERIAL ANALYSIS REPORT**



**FIGURE 14, LINER SAMPLE "A", 1<sup>ST</sup> SET OF METALLOGRAPHIC SECTIONS, 2% NITAL MACRO-ETCH.**  
 SAMPLES ORIENTED BASED ON THE AS-RECEIVED "TOP" MARKING, AS APPLICABLE  
 THE ESTIMATED "NOMINAL" WALL THICKNESS OF THE PLATE IS  $\sim 3/8$ ".

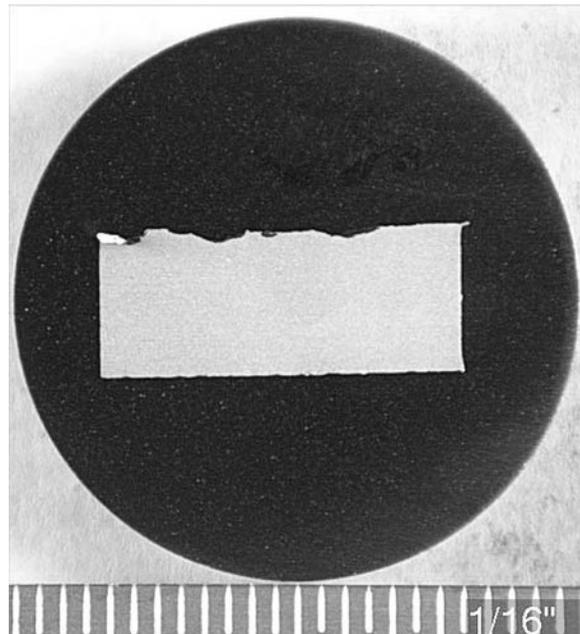
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**MOUNT #5**

THE ESTIMATED MINIMUM WALL THICKNESS THIS APPARENTLY UNAFFECTED AREA IS  $\sim 25/64$ " (**0.390"**).



**MOUNT #6**

THE ESTIMATED MINIMUM WALL THICKNESS HERE IS  $\sim 23/64$ " (**0.359"**).

**FIGURE 15, LINER SAMPLE "A", 2<sup>ND</sup> SET OF METALLOGRAPHIC SECTIONS, 2% NITAL MACRO-ETCH.  
THE ESTIMATED "NOMINAL" WALL THICKNESS OF THE PLATE IS  $\sim 3/8$ ".**

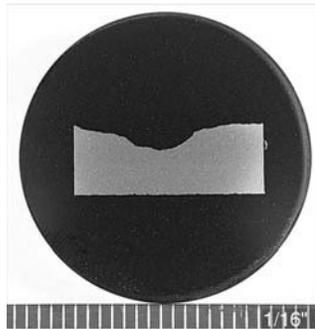
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**MOUNT #1**

THE ESTIMATED MINIMUM WALL THICKNESS IS  $\sim 11/32"$  (**0.343"**).



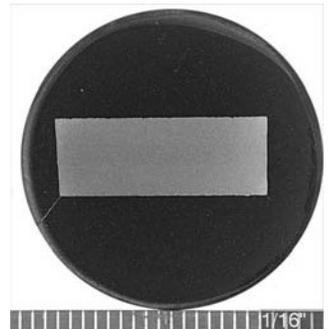
**MOUNT #2**

THE ESTIMATED MINIMUM WALL AT THE BOTTOM OF THIS PIT IS  $\sim 15/64"$  (**0.234"**).



**MOUNT #3**

THE ESTIMATED MINIMUM WALL AT THE BOTTOM OF THIS PIT IS  $\sim 7/32"$  (**0.218"**).



**MOUNT #4**

THE ESTIMATED WALL THICKNESS IN THIS SECTION IS  $\sim 25/64"$  (**0.390"**).

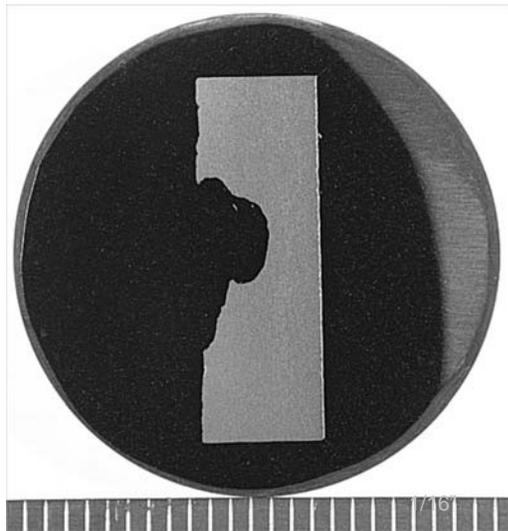
**FIGURE 16, LINER SAMPLE "B", 1<sup>ST</sup> SET OF METALLOGRAPHIC SECTIONS, 2% NITAL MACRO-ETCH.**

ALL SAMPLES ORIENTED BASED ON THE AS-RECEIVED "TOP" MARKING.

THE ESTIMATED "NOMINAL" WALL THICKNESS OF THE PLATE IS  $\sim 3/8"$ .

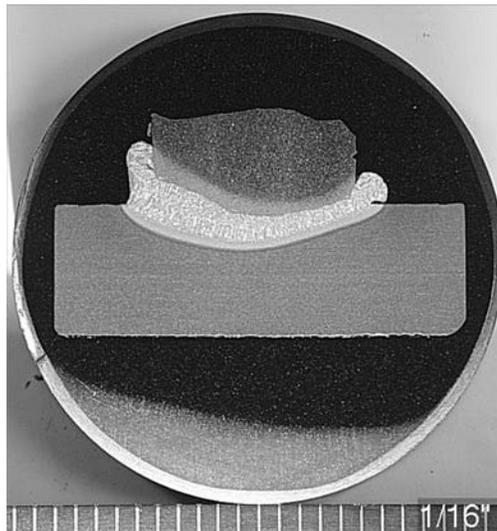
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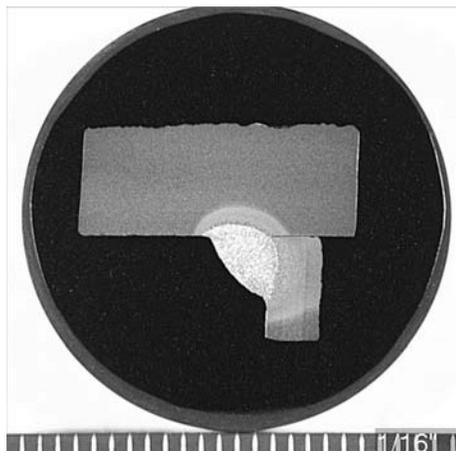
**MOUNT #5**

THE ESTIMATED MINIMUM WALL THICKNESS AT THE BOTTOM OF THIS PIT IS  $\sim 5/32$ " (0.156").

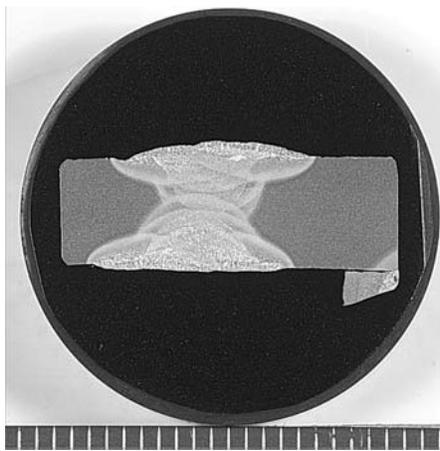


**STUD-WELD MOUNT**

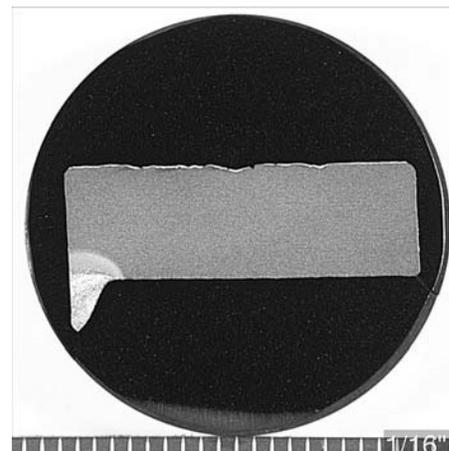
A TYPICAL FUSION/ FLASH AND HEAT-AFFECTED ZONE (HAZ) ARE SEEN.



**Q7 SIDE OF WELD**



**WELD MOUNT**

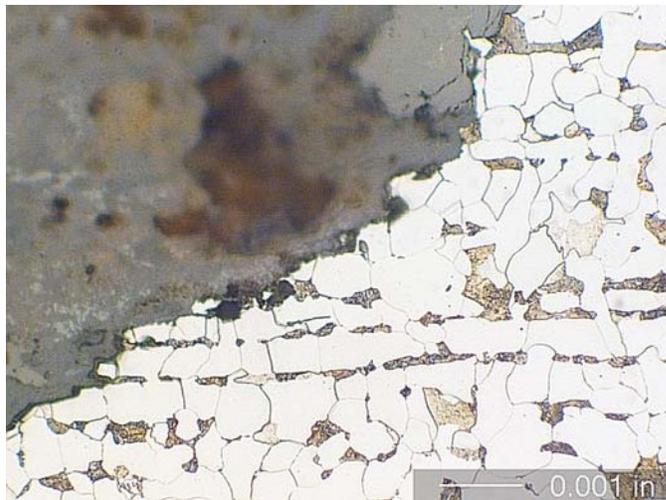
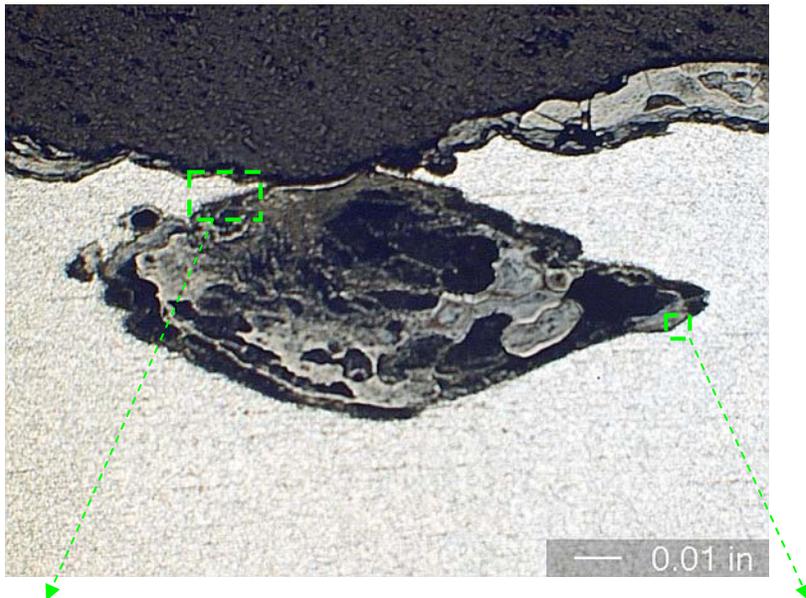


**OTHER SIDE OF WELD**

**FIGURE 17, LINER SAMPLE "B", 2<sup>ND</sup> SET OF METALLOGRAPHIC SAMPLES, 2% NITAL MACRO-ETCH.**  
 ALL SAMPLES ORIENTED BASED ON THE AS-RECEIVED "TOP" MARKING.  
 THE ESTIMATED "NOMINAL" WALL THICKNESS OF THE PLATE IS  $\sim 3/8$ ".

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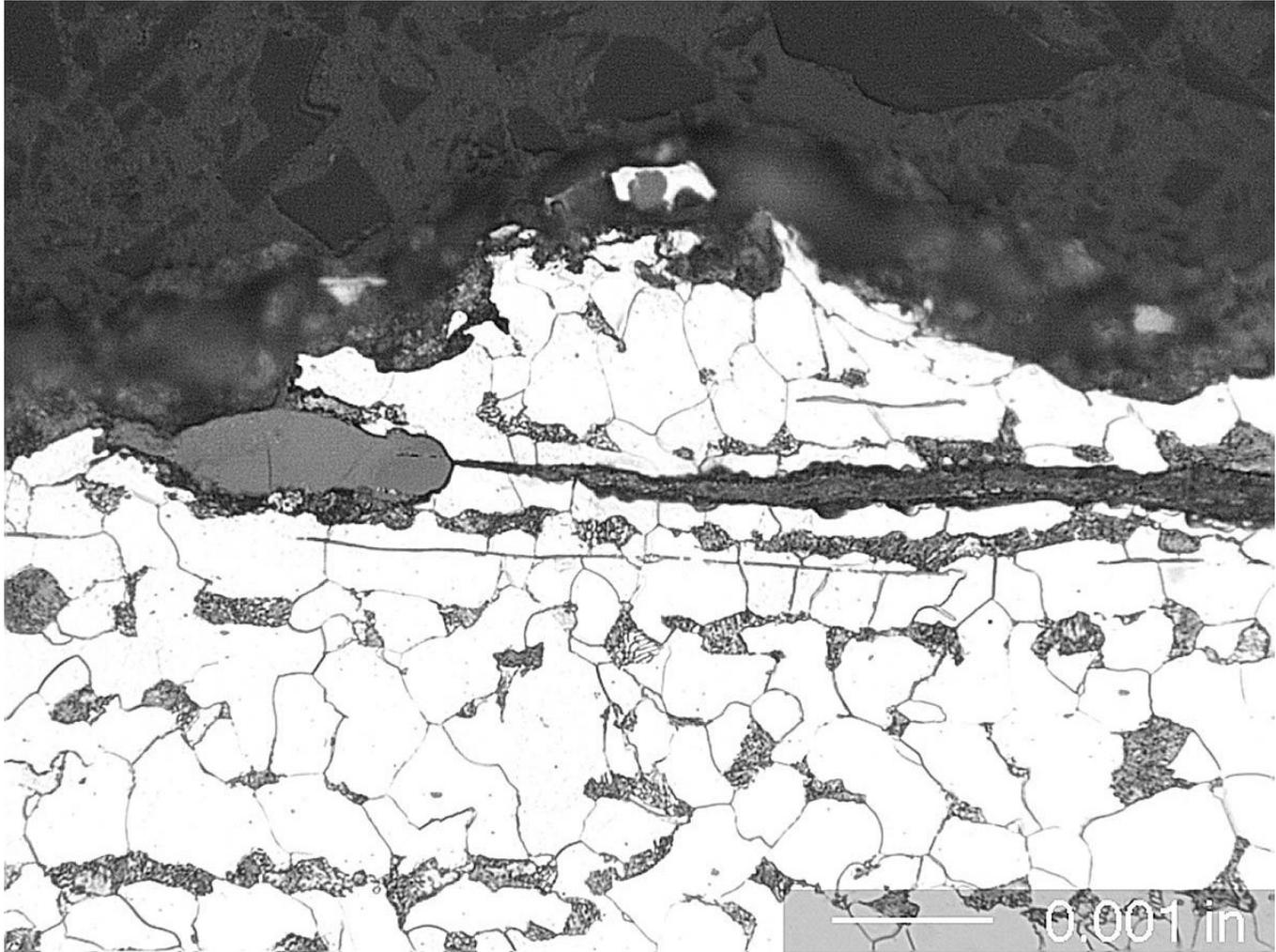
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**FIGURE 18, LINER SAMPLE "A", QUADRANT #11, SECTION #3, UNDERCUT OD PIT MICROSTRUCTURES.**

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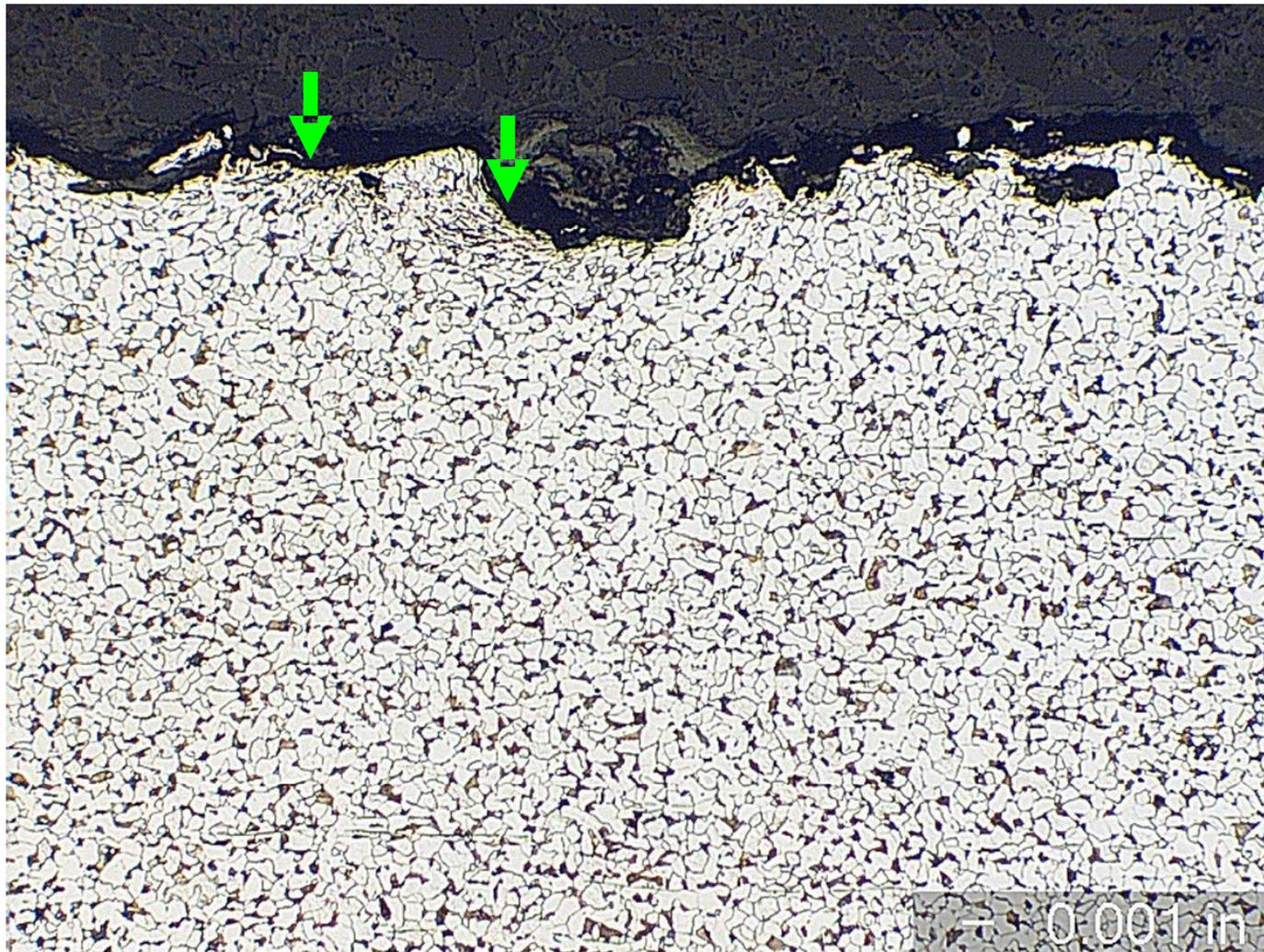
**MATERIAL ANALYSIS REPORT**



**FIGURE 19, TYPICAL LINER EXTERNAL (OD) CORROSION AREA SURFACE MICROSTRUCTURES**  
 END GRAIN CORROSION, SOME ALONG THE STRINGER INCLUSIONS, IS SEEN.  
 NOTE: THIS IS TEST SAMPLE B-Q10-#2.

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**FIGURE 20, TYPICAL LINER EXTERNAL (OD) RELATIVELY UNAFFECTED AREA SURFACE MICROSTRUCTURES.**

TRACE COLD-WORK DISTORTION (ARROWS) IS SEEN IN THIS SAMPLE, B-Q10-#4.

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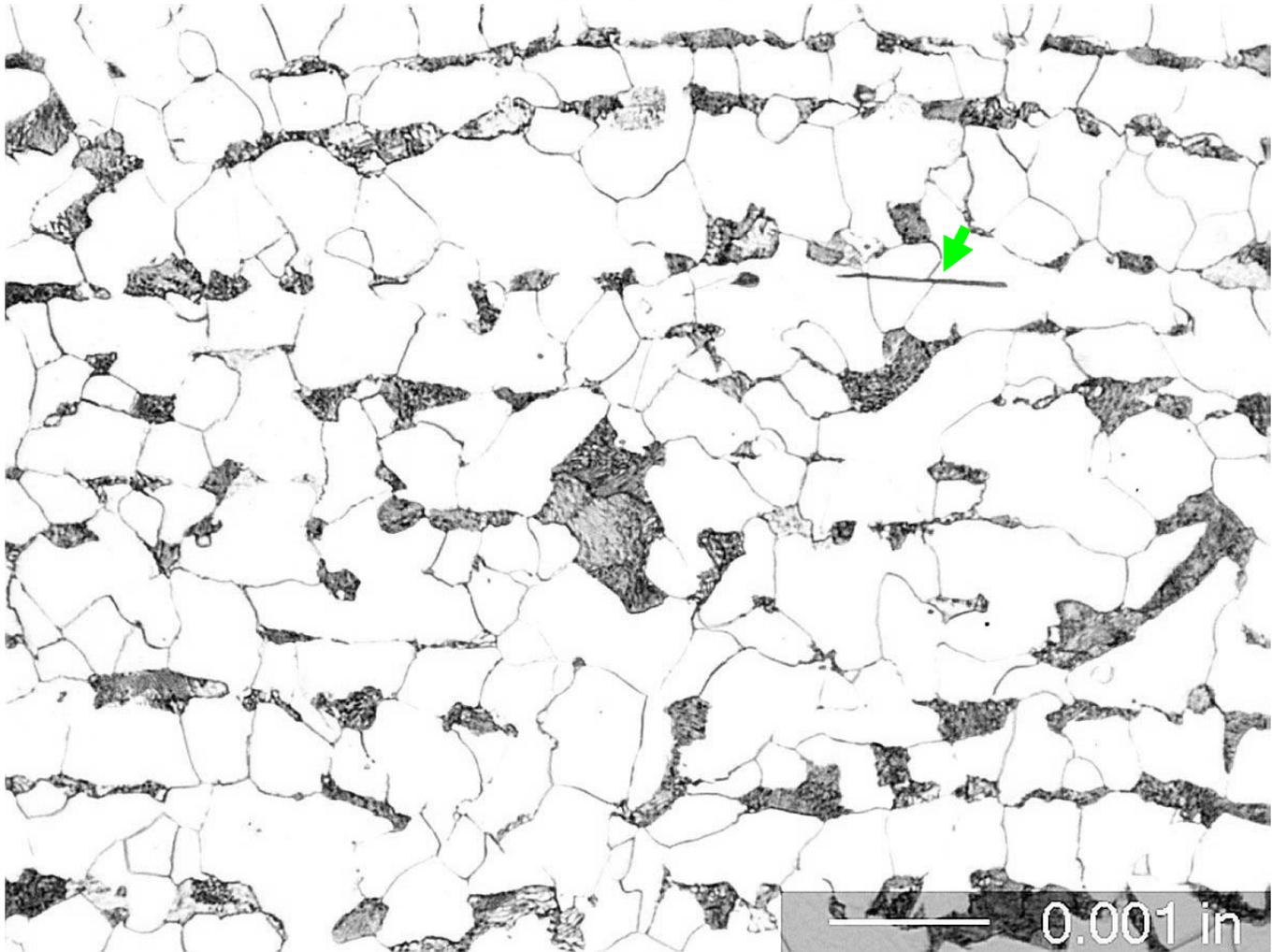


**FIGURE 21, TYPICAL LINER EXTERNAL (OD) SURFACE CORROSION AREA WITH LOCAL COLD-WORK MICROSTRUCTURES.**

TRACE COLD-WORK DISTORTION (ARROW) IS SEEN IN THIS SAMPLE, B-Q10-#1.

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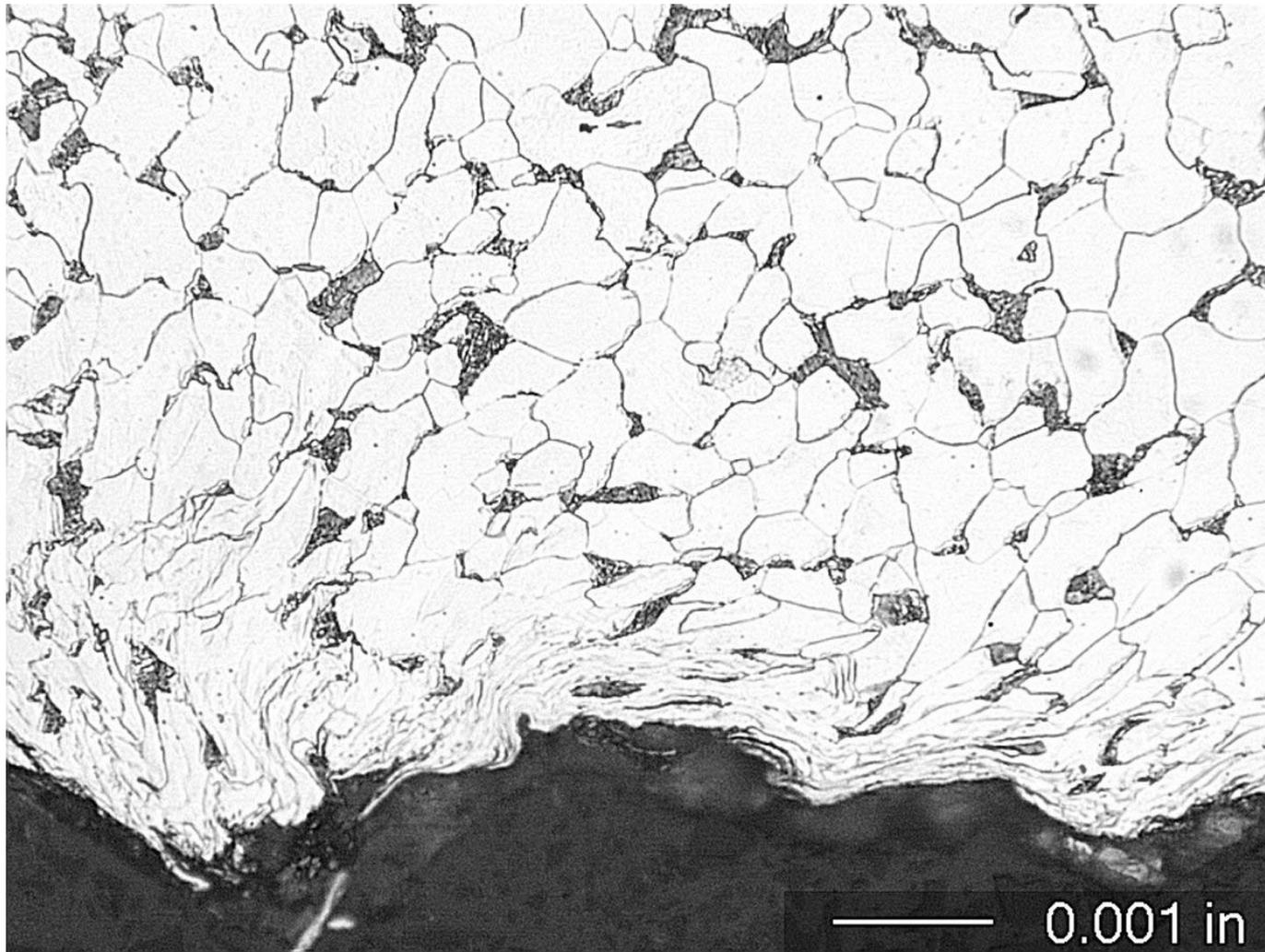
**FIGURE 22, TYPICAL LINER MID-WALL MICROSTRUCTURES.**

MICROSTRUCTURES CONSISTING OF PEARLITE COLONIES (GRAY) AND STRINGER INCLUSION (ARROW) IN A FERRITE (WHITE) MATRIX ARE SEEN.

NOTE: THIS IS TEST SAMPLE B-Q10-#2.

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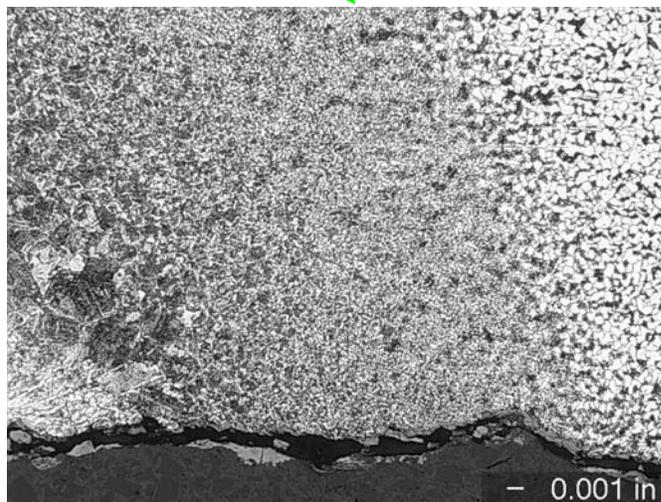
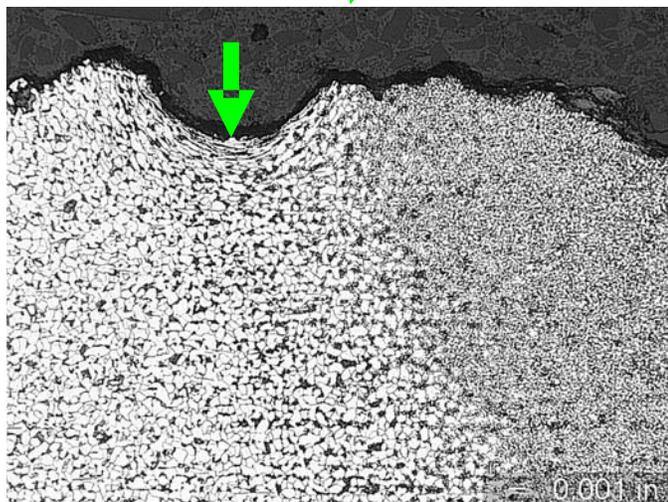
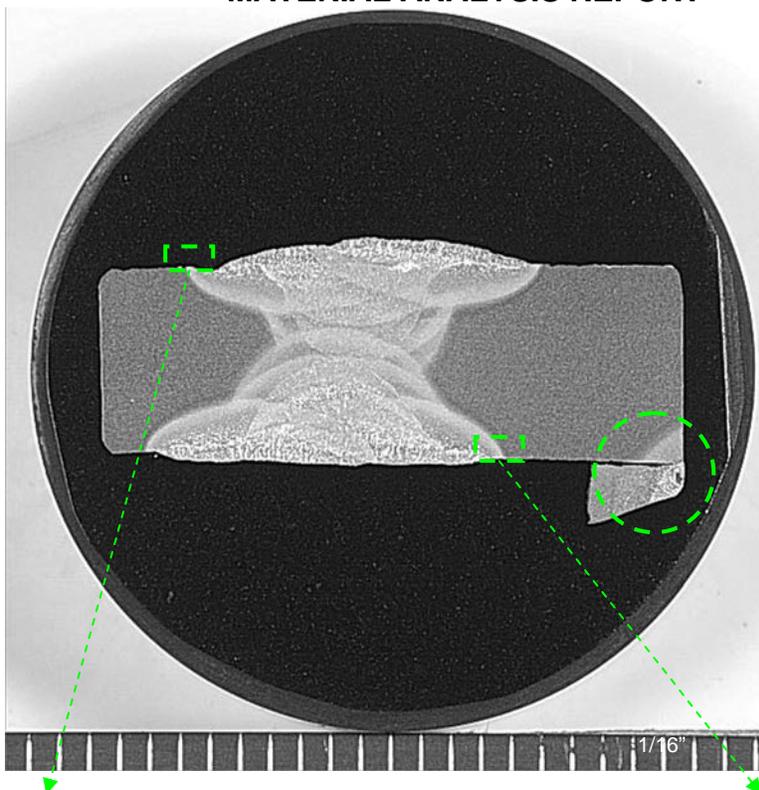
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**FIGURE 23, TYPICAL LINER INTERNAL (ID) SURFACE MICROSTRUCTURES.**  
 ABUNDANT COLD-WORK, TYPICAL OF MANY CLEANING PROCESSES, IS EVIDENT.  
 NOTE: THIS IS TEST SAMPLE B-Q10-#2.

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**FIGURE 24, LINER SAMPLE “B”, WELD SECTIONING RESULTS.**

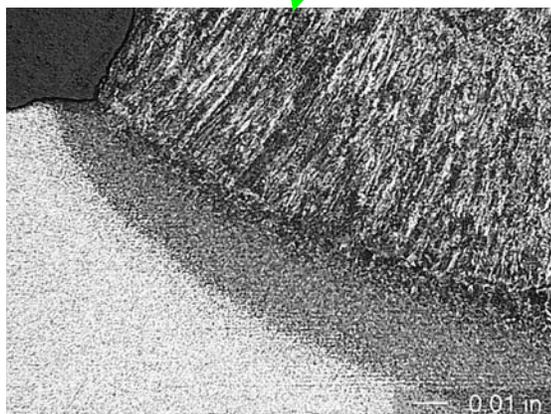
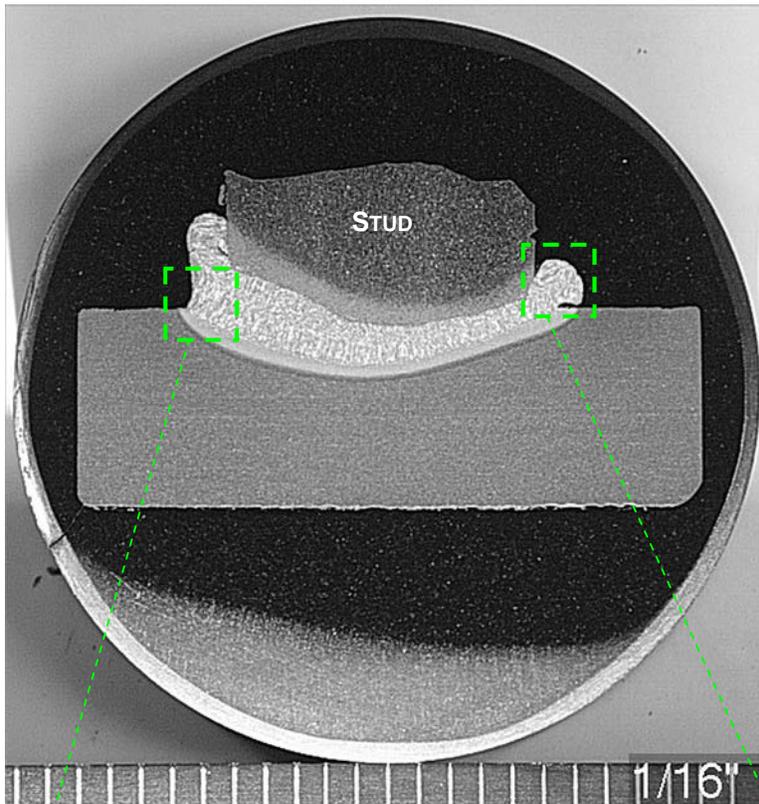
A SOUND MULTI-PASS WELD, MADE FROM BOTH SIDES, IS REVEALED.

SOME COLD-WORK DISTORTION IS SEEN (ARROW) ON THE EXTERNAL (OD, CONCRETE SIDE) SURFACES.

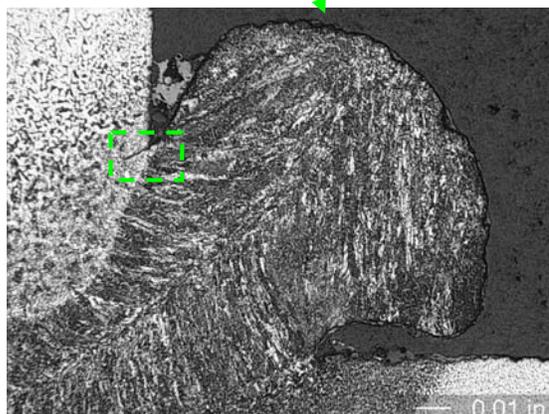
NOTE: THE REMAINS OF PART OF ONE OF THE PRESSURE-TEST CHANNEL WELDS IS CIRCLED.

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HEAT AFFECTED ZONE (HAZ) AND COARSE-GRAINED METAL TYPICAL OF A STUD-WELD.

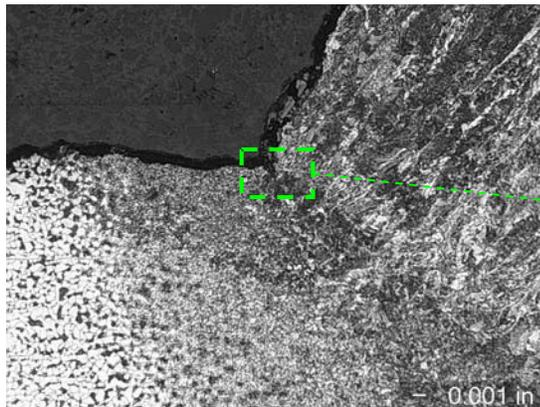


EXTRUDED FLASH TYPICAL OF A STUD-WELD; A SMALL CRACK-LIKE INDICATION IN THE STUD IS BOXED.

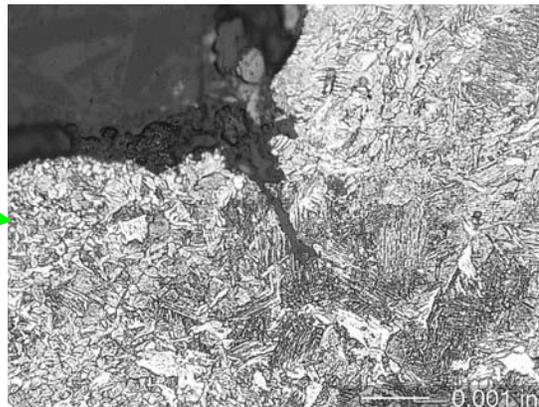
**FIGURE 25, LINER SAMPLE "B", STUD-WELD SAMPLE SECTION RESULTS.**

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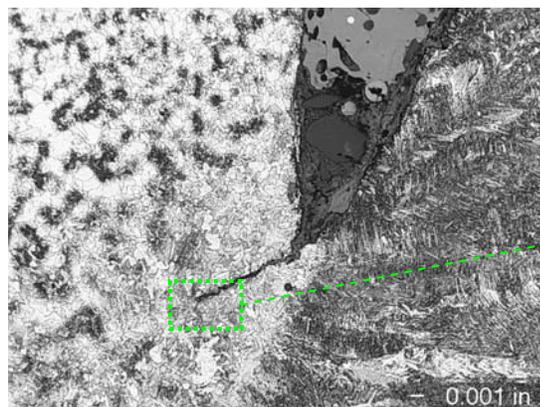
**MATERIAL ANALYSIS REPORT**



**A. STUD BASE METAL, LEFT SHOULDER INDICATION.**



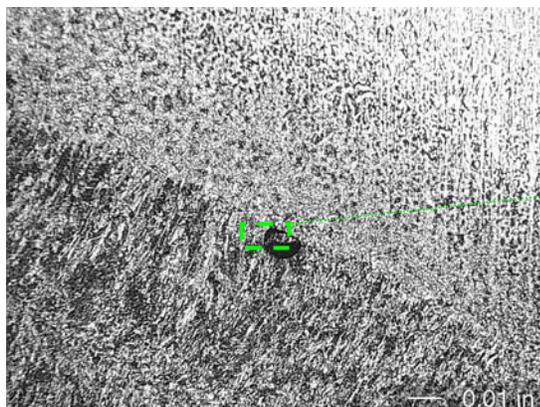
**B. DETAIL.**



**C. STUD BASE METAL, RIGHT SHOULDER INDICATION.**



**D. DETAIL.**



**E. STUD FUSION LINE PORE OR VOID.**

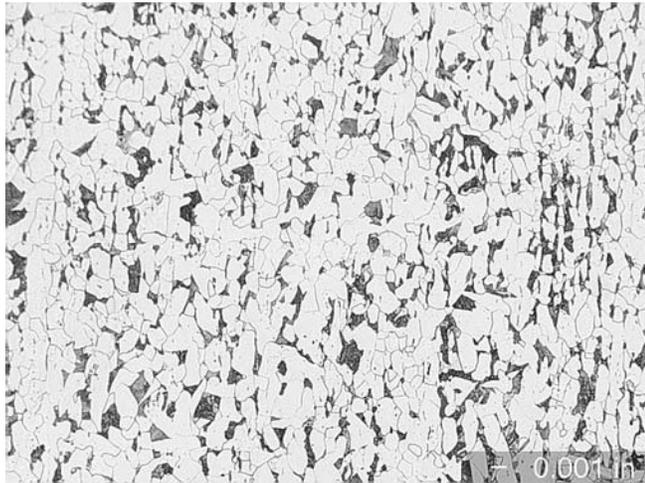


**F. DETAIL.**

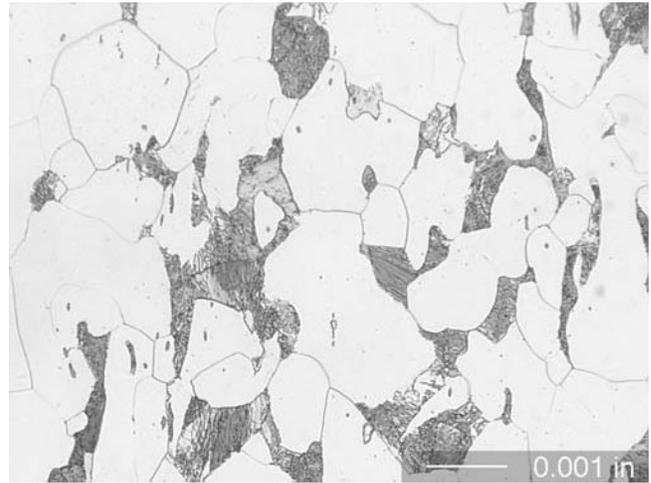
**FIGURE 26, LINER SAMPLE "B", STUD-WELD SAMPLE SECTION MICROSTRUCTURES.**

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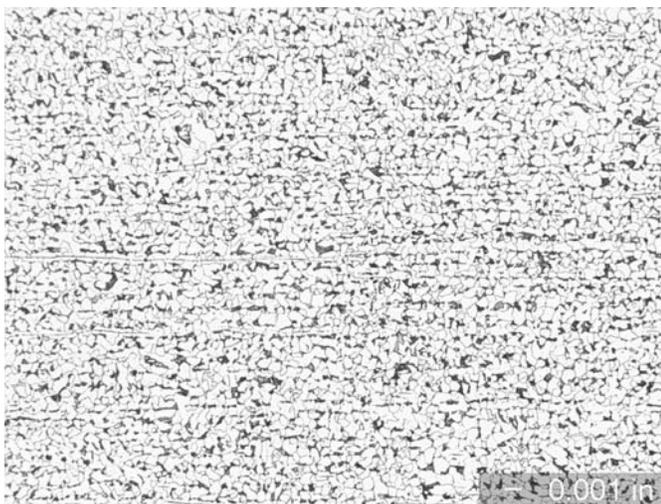
**MATERIAL ANALYSIS REPORT**



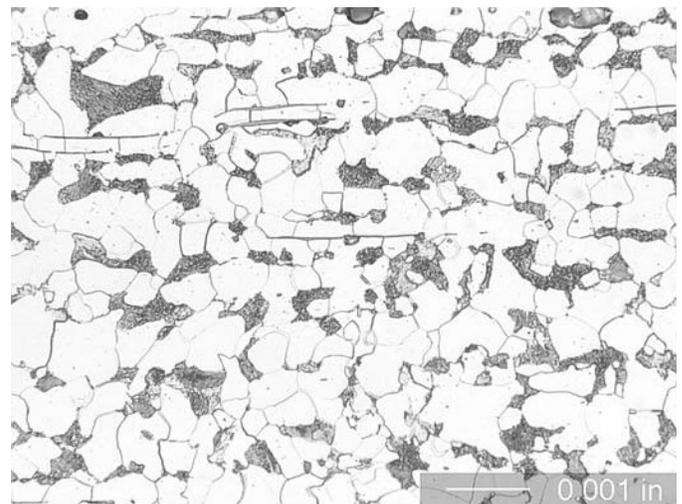
**STUD.**



**DETAIL.**



**LINER.**

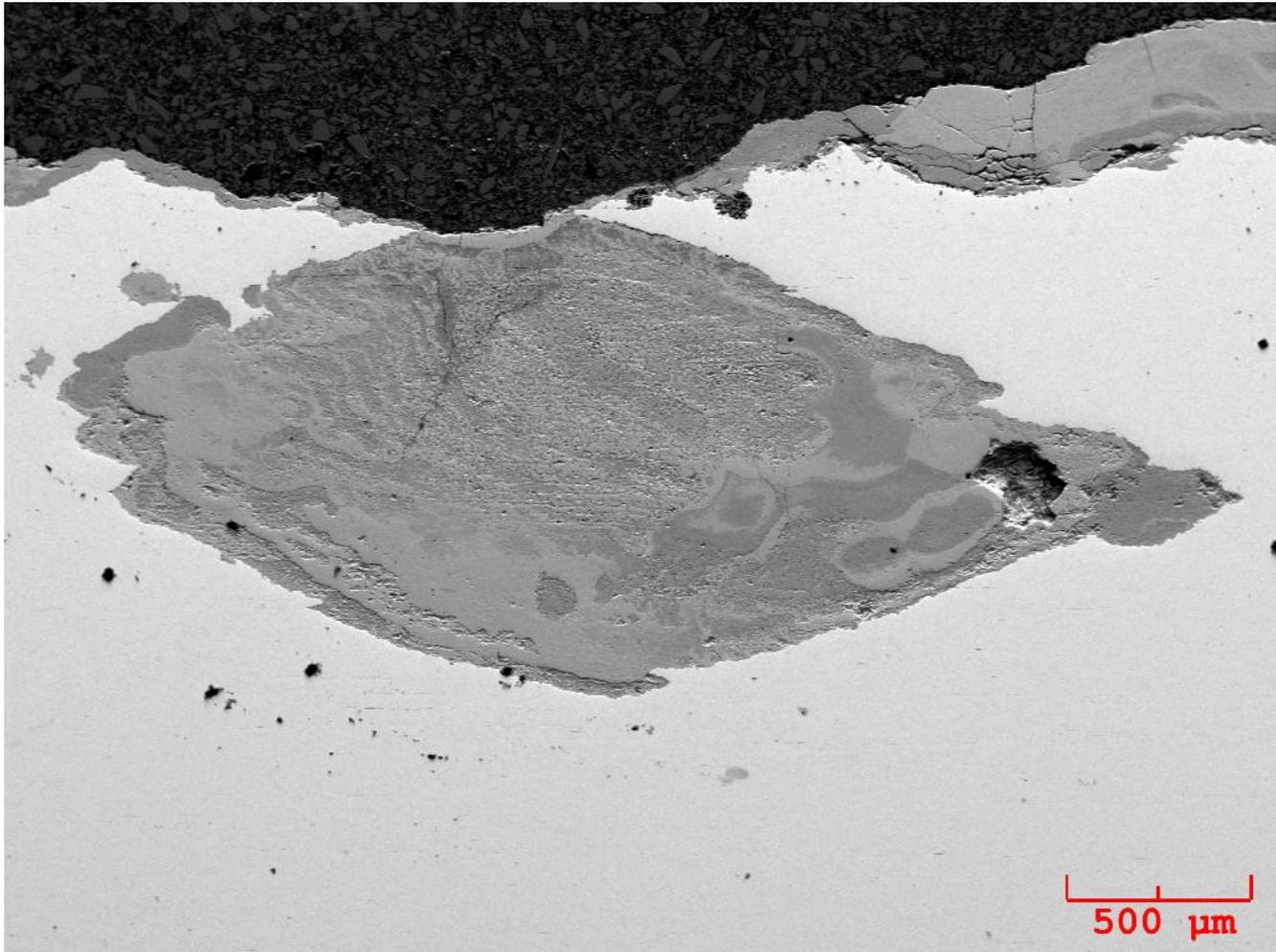


**DETAIL.**

**FIGURE 27, LINER SAMPLE "B", STUD-WELD SAMPLE SECTION, BASE METALS;  
TYPICAL MID-WALL MICROSTRUCTURES.  
FERRITE (WHITE) AND PEARLITE (GRAY) WITH STRINGER INCLUSIONS.**

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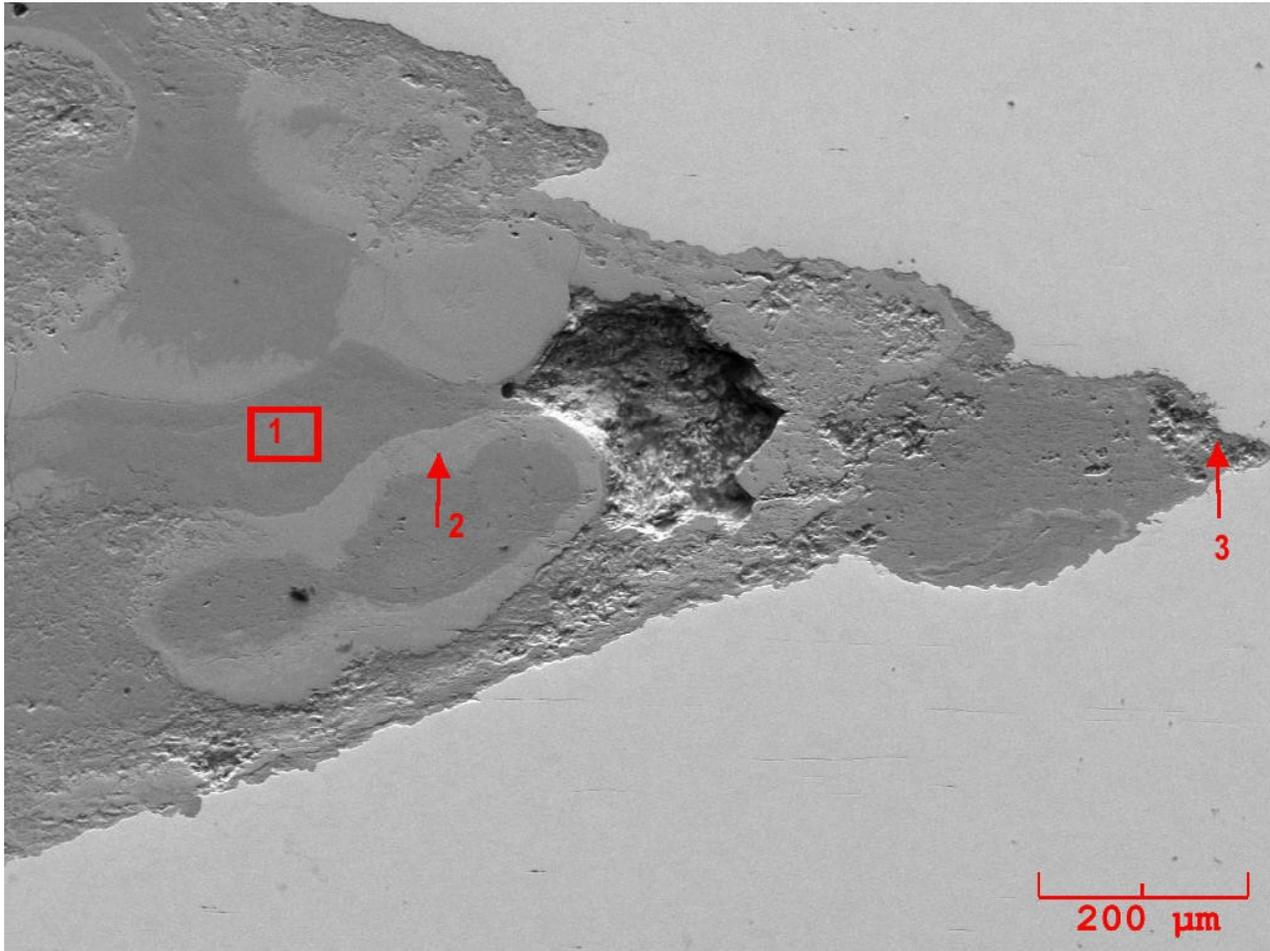
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**FIGURE 28, LINER SAMPLE "A", QUADRANT #11, SECTION #3, UNDERCUT OD PIT IN THE SEM.**

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**FIGURE 29, LINER SAMPLE "A", QUADRANT #11, SECTION #3, UNDERCUT OD PIT, DETAIL IN THE SEM**

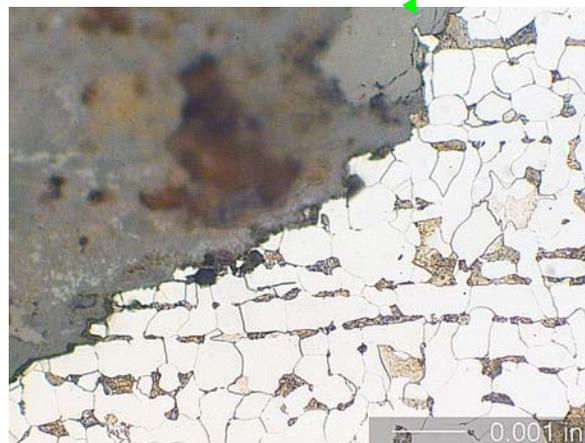
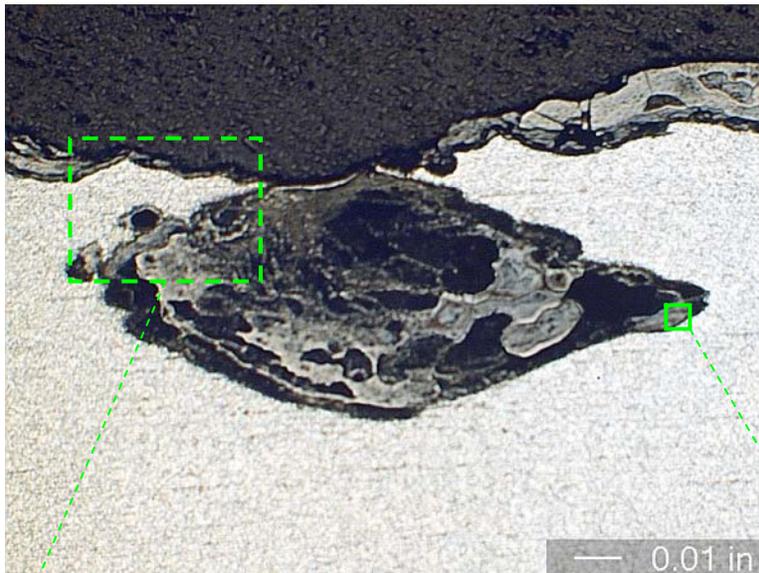
TEST SAMPLE <sup>^</sup>	CHEMICAL COMPOSITION, WT. %												
	O	NA	Mg	AL	SI	S	K	CL	CA	TI	CR	MN	FE
"BOX" 1	23.3	ND	ND	ND	0.3	ND	ND	ND	0.3	ND	ND	0.3	76.6
"SPOT" 2	19.0	ND	ND	ND	0.6	ND	ND	ND	ND	ND	ND	0.3	80.2
"SPOT" 3	23.7	ND	ND	2.7	1.8	ND	ND	ND	0.5	ND	ND	1.2	70.0

NOTES: \*THE SAMPLES WERE REVIEWED UTILIZING SCANNING ELECTRON MICROSCOPY (SEM) AND ENERGY DISPERSIVE X-RAY SPECTROSCOPY (EDS). ANY QUANTITATION OF SPECTRA IS CALCULATED BY A STANDARDLESS EDS ANALYSIS PROGRAM. DUE TO THE NATURE OF THE TECHNIQUE ALL VALUES SHOULD BE CONSIDERED APPROXIMATIONS AND "FOR INFORMATION ONLY".

<sup>^</sup>METALLOGRAPHIC SECTIONS, AS-POLISHED WITH ALUMINUM OXIDE. ND = NOT DETECTED.

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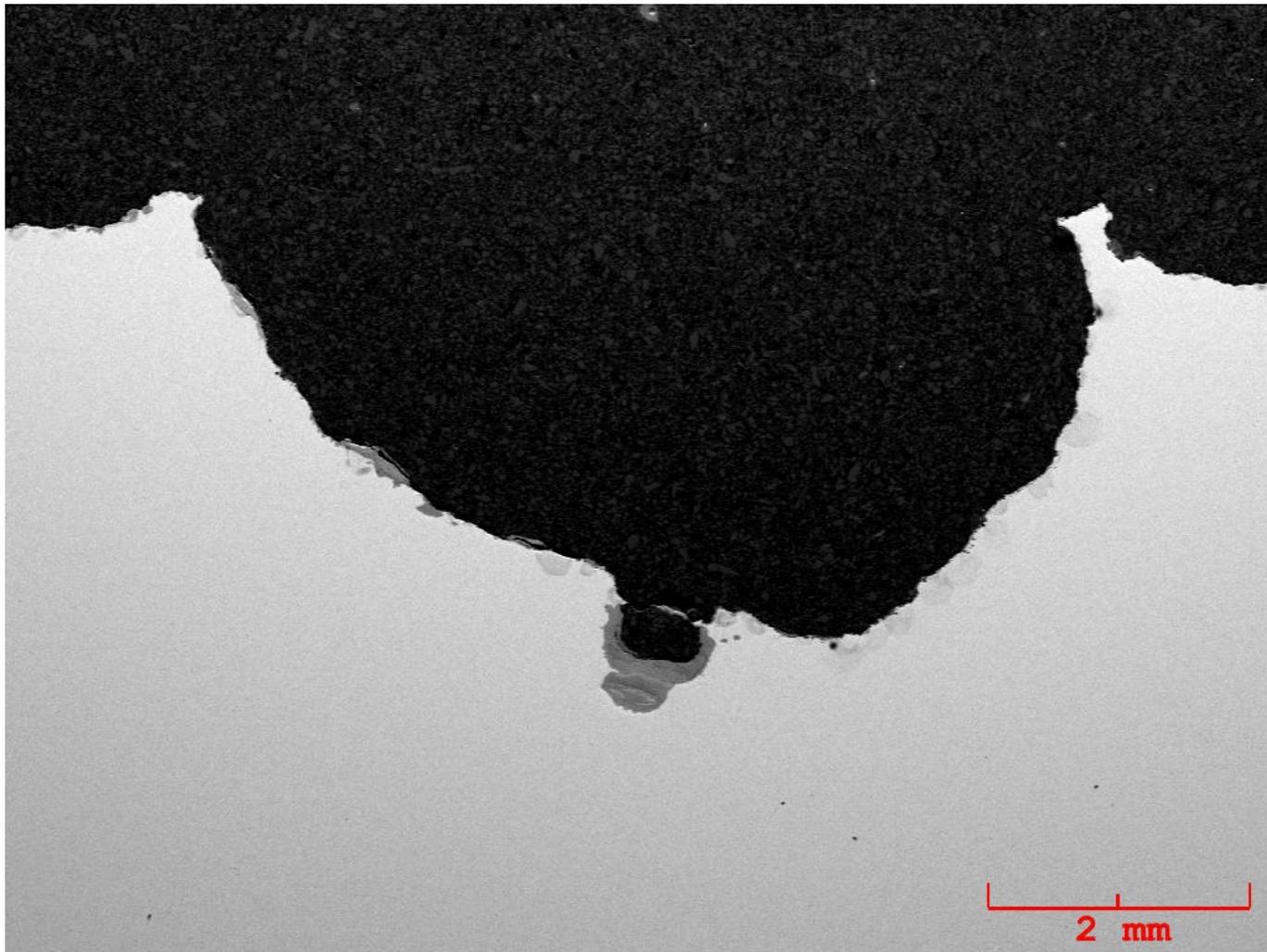
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**FIGURE 30, LINER SAMPLE “A”, QUADRANT #11, SECTION #3, UNDERCUT OD PIT MICROSTRUCTURES.**

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**FIGURE 31, LINER SAMPLE "B", QUADRANT #10, SECTION #3, OD PIT IN THE SEM.**