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Q200903310001

Scientific Notebook No. 884: I580 Bridge
Collapse (06/22/2007 through 10/05/2007)

LABORATORY NOTEBOOK

GEOSCIENCES & ENGINEERING DIVISION

CONTROLLED COPY NO. 884
20.14004.01.001

NOTEBOOK NO. 884
ISSUED TO DARRELL DUNN *[Signature]* **DD**
ON 6/22 **2007**
DEPARTMENT CNWRA
RETURNED 3/28 **2009**

Dustin Nall Dustin Nall DN

Title: I580 Bridge Collapse

SCIENTIFIC NOTEBOOK COMPANY
2831 LAWRENCE AVENUE
STEVENSVILLE, MICHIGAN 49127
(800) 537-3028 - <http://www.snco.com>

I-580 Sample Collection

Samples collected on Wednesday June 13.

Persons present were: Ken Brown (Caltrans) Gardner (American Metals), Darrell Dunn (SwRI), Bob Shewmaker (NRC). Additional Caltrans staff were present to observe and record sample collection. Staff from American Metals were also present to collect samples.

Samples collected included the following:

NRC Sample Number	Girder Identification	Description
NRC 1H	PG 3 MB 19	Plate at MB 19 end with rivet holes
NRC 1S	PG 3 MB 19	Plate w/stiffener near MB 19 end
NRC 2	PG 4	Plate with Butt Weld
NRC 3	PG 5	Plate w/stiffener heavy distortion
NRC 4	PG 5	Plate w/stiffener medium distortion
NRC 5	BG 7	Lower plate with side and Weld
NRC 6	BG 8	PG 1 or 6 with reduction in area
NRC 7	BG 8	Rivet head
NRC 8	PG 10 MB 20	Near MB 20 Web and plate with weld
NRC 9	PG 12	Plate with stiffener near MB 18 end
NRC 10	BG 8	Flakes peeled off of plate girder angles

PG refers to plate girder
BG refers to box girder
MB is a Bent number (Caltrans) that indicates the number and position of support structures.

Location of the samples collected were recorded in 12 pages of a field notebook. Copies of these pages are included in the following notebook pages. Photographs of the sample collection are included.

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Date: 6/22/07

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Date

6/13/07

Initial meeting with Ken Brown at Caltrans yard at 210 Burma in the old Oakland Army Base

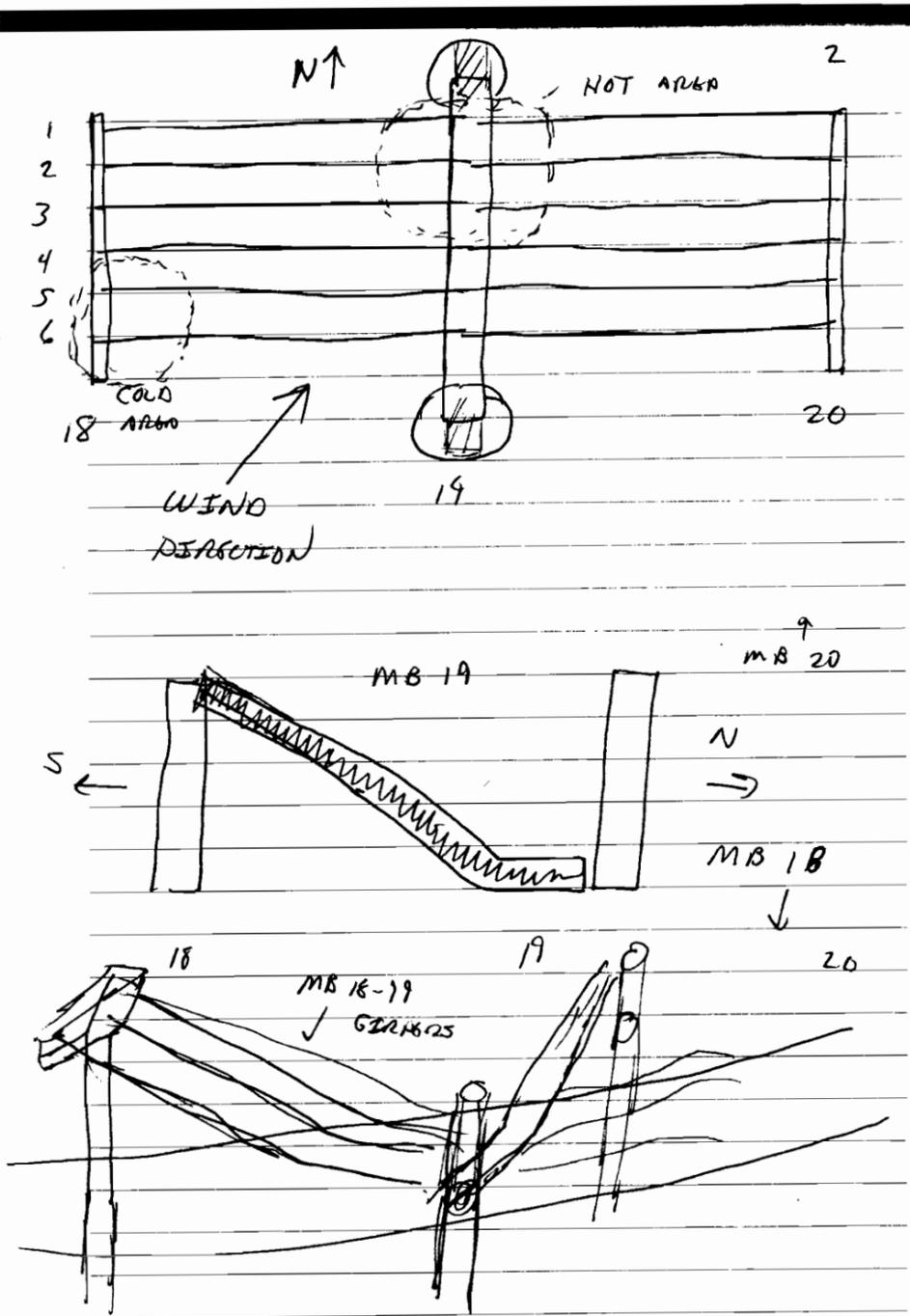
Info from Ken Brown:

- Structures were painted with a lead based paint and covered with a latex paint
- Green or silver color is latex paint
- Red - orange paint is lead based paint
- Originally the material was removed and put in a salvage yard
- Material was recovered from the yard and placed in Caltrans storage lot.
- Outside beams/girders did not have stiffeners
- About 20% of material is missing

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6/22/07

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Date

3

I 580 BEAMS

YELLOW PAINT GIRDER TYPE MB 18/19/20
5 PLATE / BOX SPAN

1	PLATE	MB 19
6	PLATE	MB 18
#10	PLATE	MB 20
9	PLATE	MB 18
17	PLATE	MB 20
13	PLATE G-4	MB 18-19
15	PLATE G-3	MB 18-19
5	PLATE	
4	PLATE	MB 18-19 NANORISC BOND?
3	PLATE	MB 19 END
12	PLATE	MB 18 END
7	BOX	MB 19 N NEAR END FAULT
8	BOX	MB 19 S W BEARING STEEL UP

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4

SAMPLES

LOCATION	CALTRANS SAMPLE #
MB 19 END PG 3 (2 SAMPLES)	NRC 1
PG 4 BUTTWELD	NRC 2
PG 5 DEFORMED	NRC 3
PG 5 MINOR DISTORTION	NRC 4
BG 7	NRC 5
BG 8 - PG 10A C	NRC 6
BG 8 - RIUGT	NRC 7
PG 10 MB 20 END	NRC 8
PG 12	NRC 9

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Date

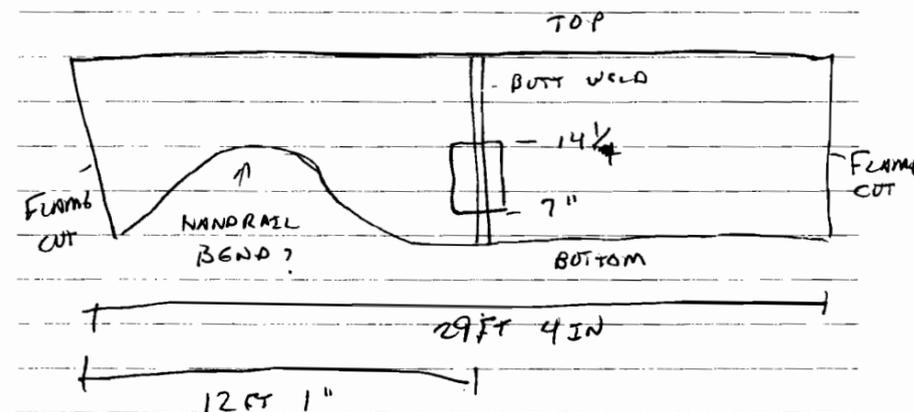
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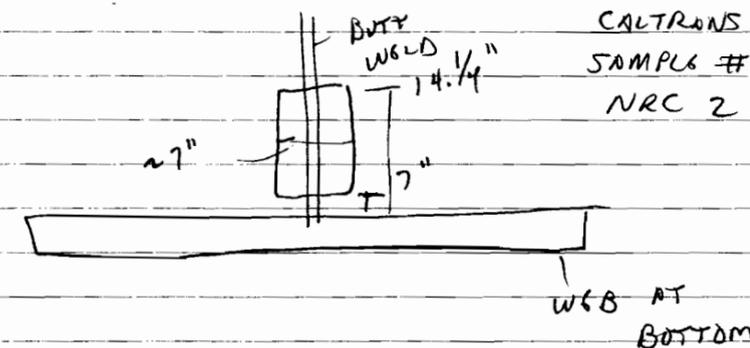
5



SAMPLE FROM PLATE THAT INCLUDES BUTT WELD

SAMPLE TAKEN FROM NEAR BOTTOM OF PLATE

PLATE GIRDER MAY HAVE BEEN FROM MB 18 TO MB 19 ON SOUTH SIDE OF RR 6/13/07 NORTH SIDE WHICH FELL ON TOP OF HAND RAIL



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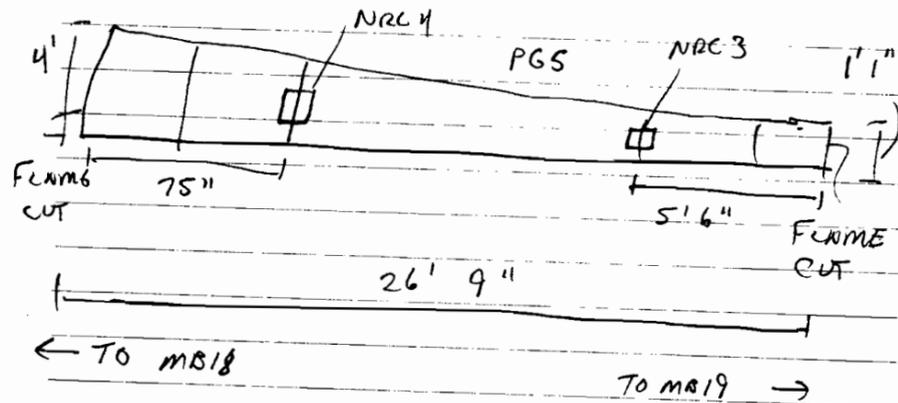
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SAMPLES INCLUDE STIFFENER & WELD

PGS WAS MOST LIKELY LOCATED BETWEEN MB 18 & MB 19. THE MOST NEARLY REFORMED END WAS TOWARDS MB 19. BOTH ENDS WERE FRAME CUT SO MOST LIKELY THIS WAS A MID SECTION SPAN.

SAMPLE NRC 3 WAS CONCRETE RUBBLE ADHERING TO THE SURFACE.

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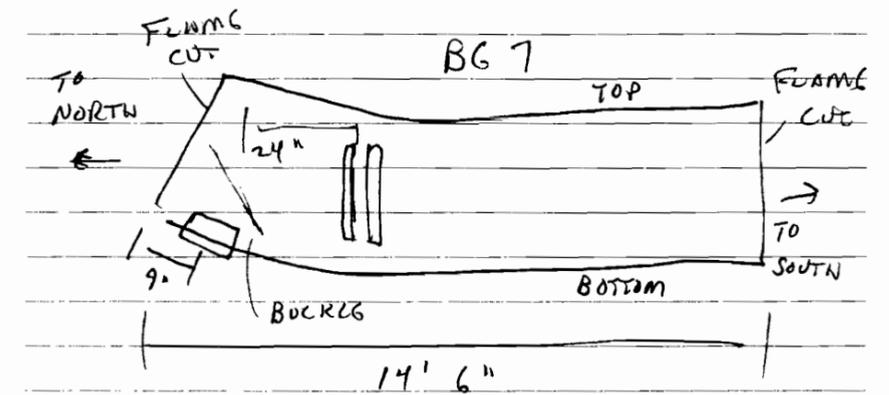
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CALTRAW SAMPLE NRC 5

SAMPLE FROM BG 7 WAS FROM THE BOTTOM PLATE WITH THE WELD AND A PORTION OF THE VERTICAL PLATE. THE SAMPLE INCLUDES WELD METAL.

SAMPLE TAKEN FROM END NEAR ~~FOUR~~ ^{6/13/07} NORTH END NEAR BUCKLE ON VERTICAL PLATE.

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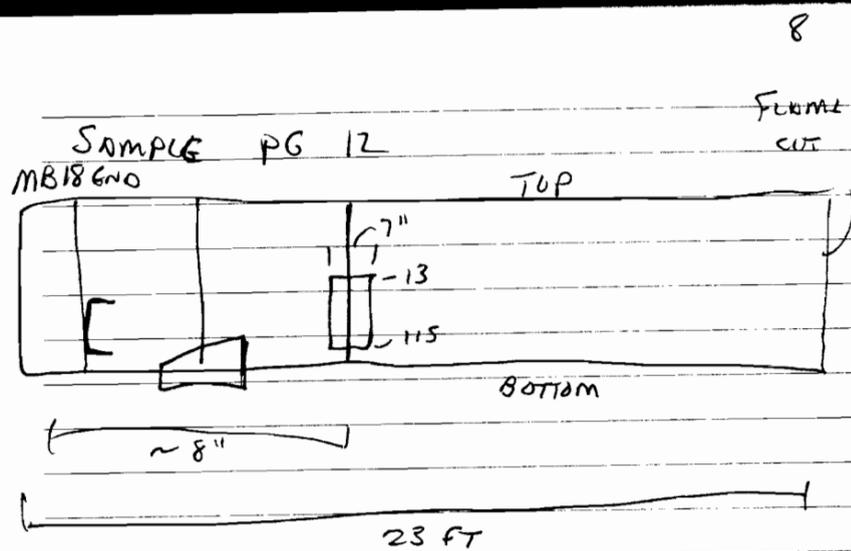
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CALTRANS SAMPLE NRC 9

SAMPLE FROM NRC 9 / PG 12 WAS OBTAINED NEAR THE MB 18 END

THE MB 18 END SHOULD BE COOL OR COLDER WITH RESPECT TO THE MB 19 END

SAMPLE INCLUDES STIFFENER AND WELD METAL. SAMPLE HAS INTACT PAINT

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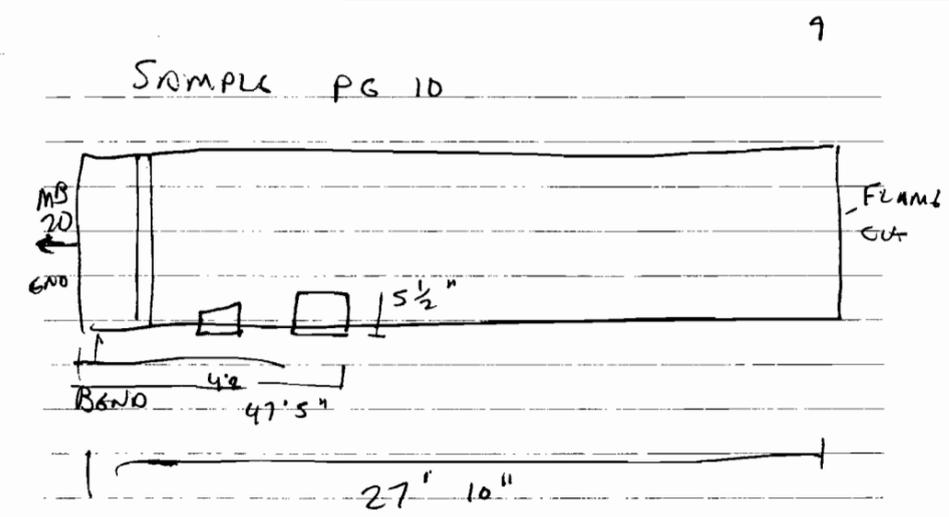
[Signature]

Date

6/22/07

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Date



CALTRANS SAMPLE NRC 8

SAMPLE PG 10 WAS TAKEN FROM THE BOTTOM AND INCLUDES WEB & PLATE MATERIAL WITH WELD

SAMPLE SHOULD BE COLDER WITH RESPECT TO MB 19
DO 6/13/07

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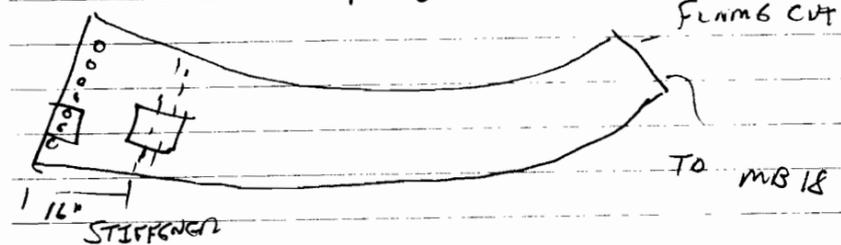
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MB 196ND

PG 3 SAMPLE

10



FLANGE CUT

TO MB 18

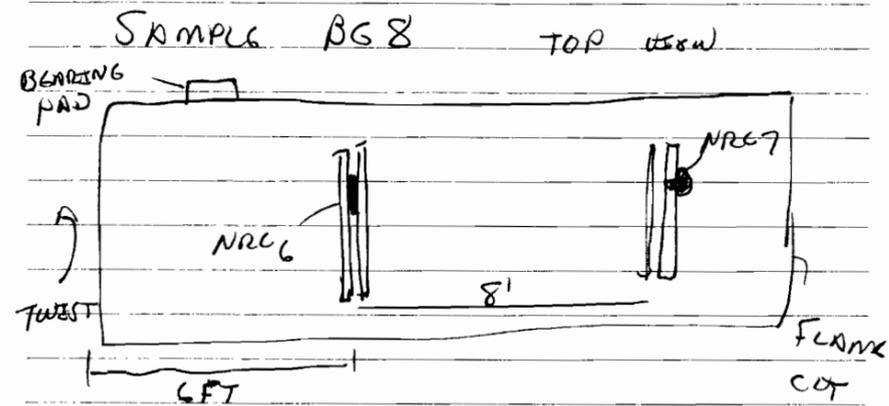
CALTRANS SAMPLE NRC 1

TWO SAMPLES OBTAINED FROM PG 3

ONE SAMPLE INCLUDED DISTORTED RUST
 NUTS ONE CONTAINING PLATE
 STIFFENER AND WELD METAL FROM
 THE FIRST STIFFENER

BOTH SAMPLES WERE FLANGE CUT

11



SAMPLES INCLUDE PLATE GIRDER WHICH
 WAS DEFORMED AND STILL ATTACHED
 TO THE ANGLE PLATES WITH NUTS

CALTRANS SAMPLE NRC 6

SAMPLE NRC 7 WAS A NUT WHICH
 WAS LOOSE AND COULD BE REMOVED
 BY HAND

12

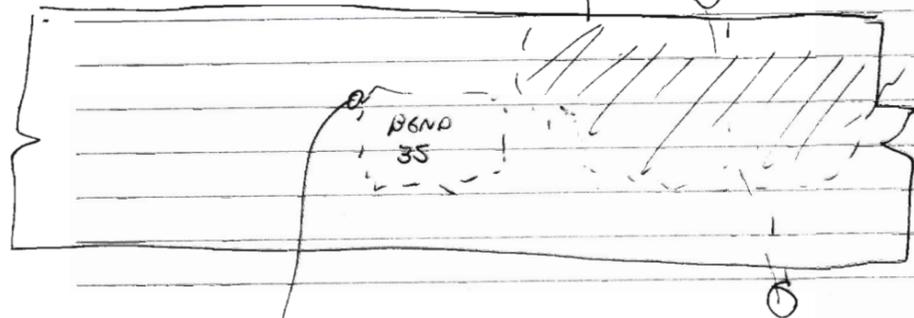
Conversation with PORAN GLANZ
and ROSME AGUIAR

Trunk was aluminum and approximate
1/3 of trunk was melted

W hubs were aluminum and all wheels
were melted

Solidified Al was found on
deck after cooldown and
during cleanup

spalled concrete due to
heat and compression



Drain allowed fuel MB
to drain and burn below 19
I 880 deck: Passage to
Bend 35 Pillar due to fire



Plate Girder 5 (D. Dunn 6/13/07)

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Date

6/22/07

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6/22/07

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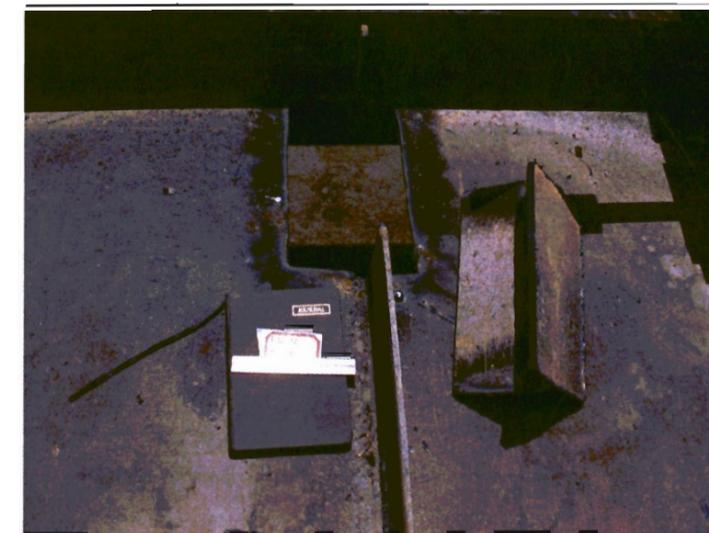
[Signature]



Plate Girder 1



Plate Girder 12



Sample cut from Plate Girder 12



Sample cut From Plate Girder 5

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Date

Verified by:

Date

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6/22/07

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Date

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Date

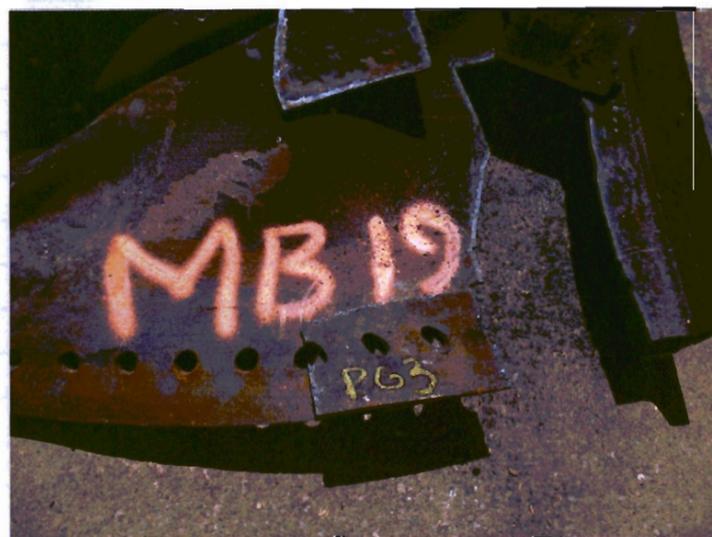
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Sample cut from Plate Girder 4



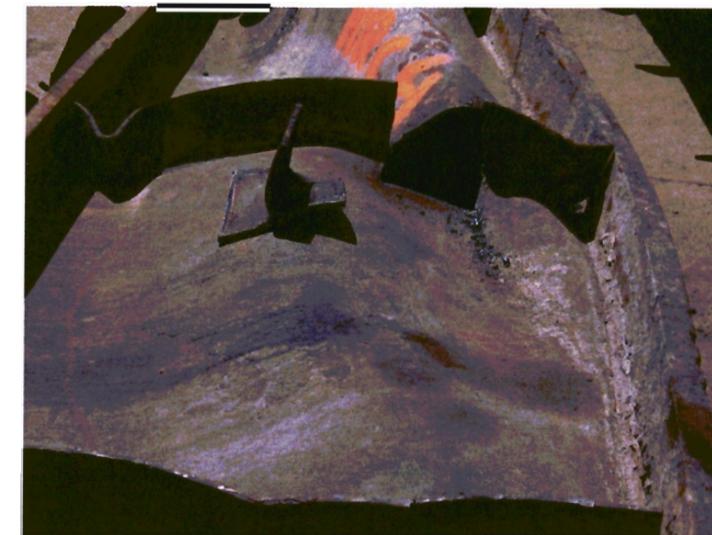
Samples cut from Plate Girder 3

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Date: 6/22/07

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Date: _____



Second samples from plate girder 5



Sample from plate girder 10

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Date: 6/22/07

Verified by: *[Signature]*

Date: _____



Sample cut From Box Girder 8 (remaining section of plate girder)



Sample cut from Box Girder 7

Recorded by:

Paul D

Date

6/22/07

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Date



Rivets and scale on box girder 8



Samples after collection

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Paul D

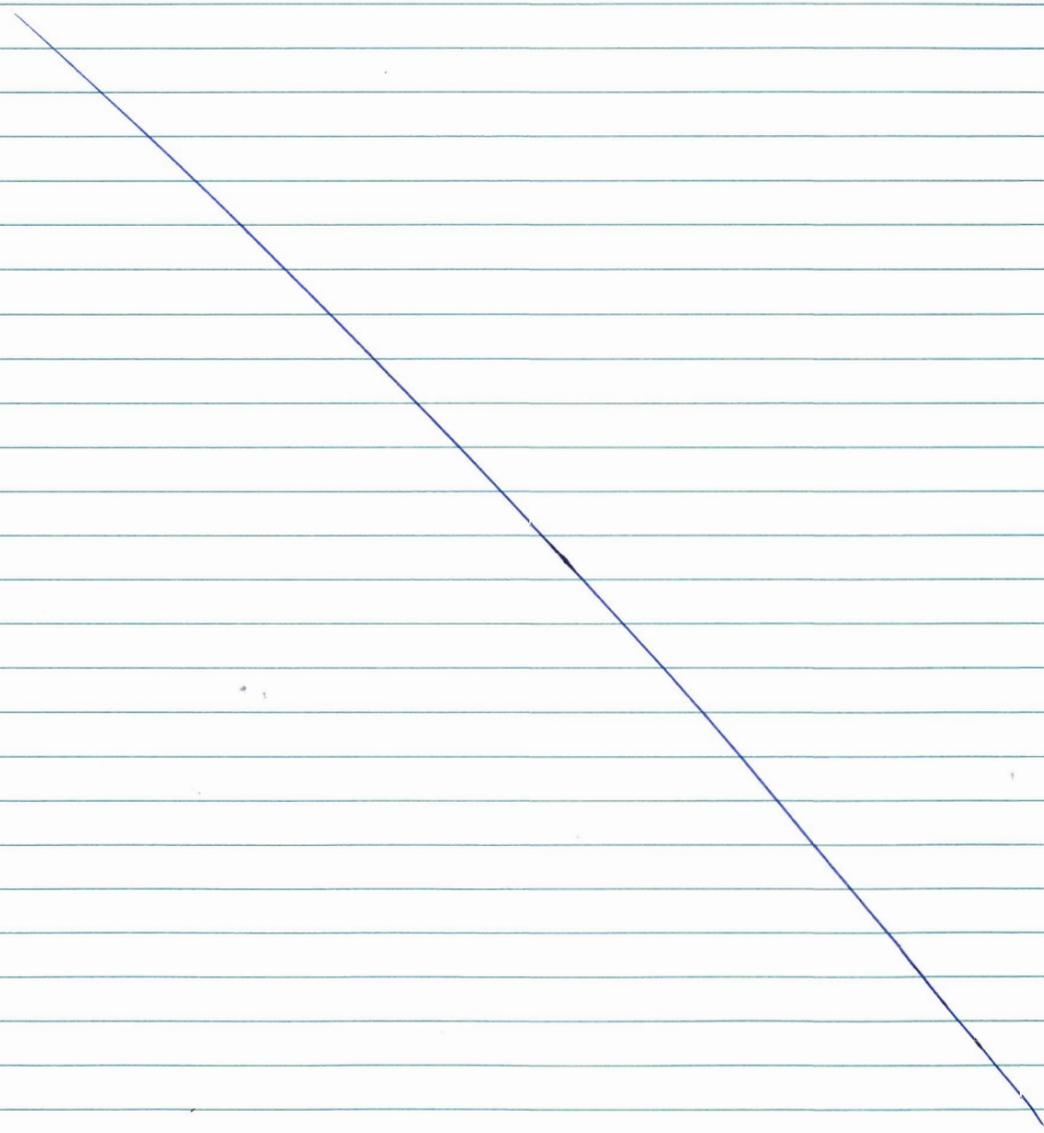
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Pictures from Caltrans of I-580
 The following pages contain picture from the
 Caltrans web site. Pictures were taken at various
 points after the accident and during demolition

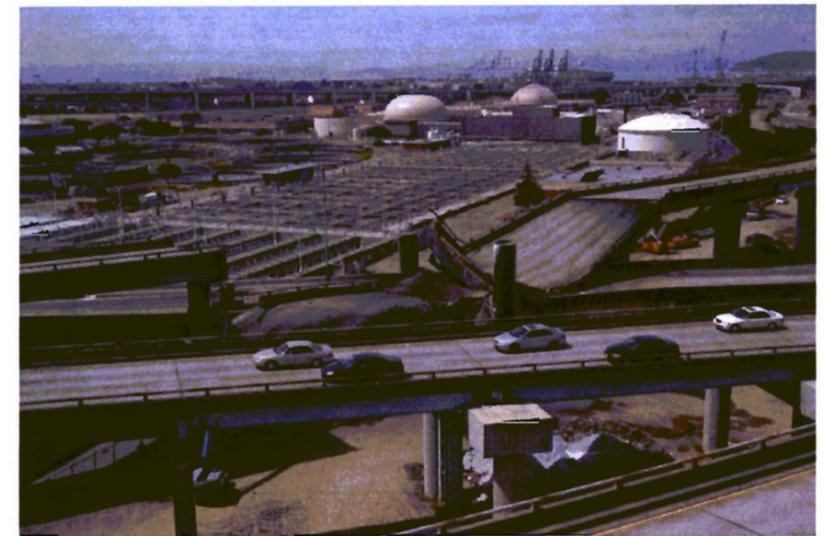
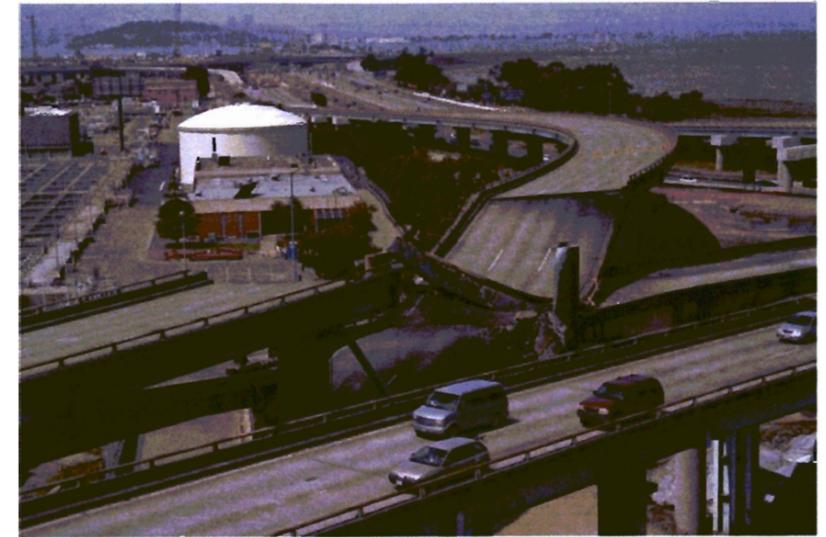


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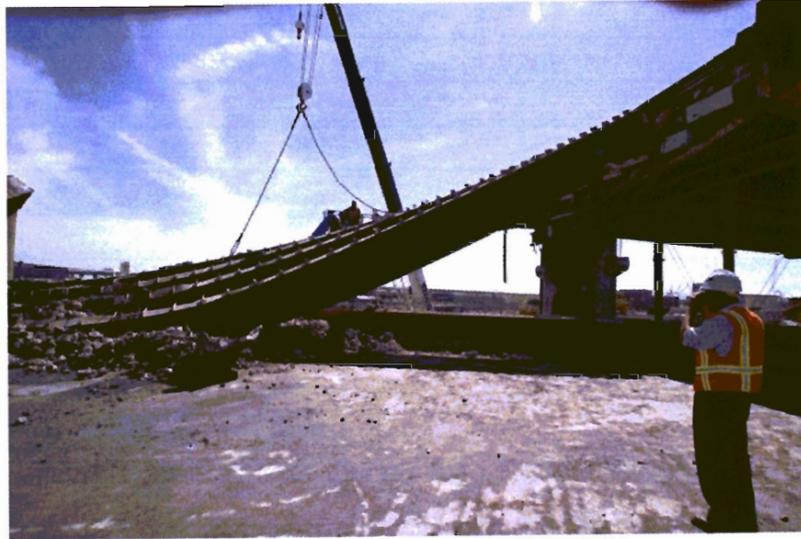
Photos of collapsed I-580 (Caltrans website)

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 7/9/07

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Date



Photos of collapsed I-580 during demolition (Caltrans website)

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Date: _____



Photos of collapsed I-580 during demolition showing remains of truck (Caltrans website)

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Date: 7/9/07

Verified by: _____

Date: _____

Examination of I-580 Bridge Samples

Work conducted for Asad Chowdhury Div 20
 Div 18 contact: Darrell Dunn x6090
 Charge number 20.06003.06.061

Sample Identification Nomenclature

PG = Plate Girder
 BG = Box Girder
 MB = Bend number

Sample Description

NRC Sample Number	Girder Identification	Description	Examination
NRC 1H	PG 3 MB 19	Plate at MB 19 end with rivet holes	Microstructure near holes
NRC 1S	PG 3 MB 19	Plate w/stiffener near MB 19 end	Weld and Base metal
NRC 2	PG 4	Plate with Butt Weld	Weld and Base metal
NRC 3	PG 5	Plate w/stiffener heavy distortion	Weld and Base metal
NRC 4	PG 5	Plate w/stiffener medium distortion	Weld and Base metal
NRC 5	BG 7	Lower plate with side and Weld	Weld and Base metal
NRC 6	BG 8	PG 1 or 6 with reduction in area	Microstructure in reduced area section of sample
NRC 7	BG 8	Rivet head	Microstructure
NRC 8	PG 10 MB 20	Near MB 20 Web and plate with weld	Weld and Base metal
NRC 9	PG 12	Plate with stiffener near MB 18 end	Weld and Base metal
NRC 10	BG 8	Flakes peeled off of plate girder angles	Microstructure and EDS

Examination Procedure

1. All samples and specimens cut from samples need to be labeled at all times. Specimens cut from samples will be numbered sequentially using the Sample number as an identifier. For example two samples cut from NRC 1S will be labeled NRC 1S-1, and NRC 1S-2 respectively.
2. Specimens will be obtained from material that is at least 2 inches from torch cut edges.
3. Location of all specimens will be noted.
4. Excess material is significant size will be removed to obtain specimens will be labeled and retained.
5. Specimens will be cut using methods that do not heat the specimen above 200 °C.
6. Specimens will be mounted and polished for microstructure examination.
7. All polishing and etching procedures will be documented.
8. Photographs of the specimens will include specimen identification.
9. Instruments used in the examination will be identified.
10. All data (i.e. photographs, spectra) will be saved in electronic format.

Recorder: _____

Date

Verified by: _____

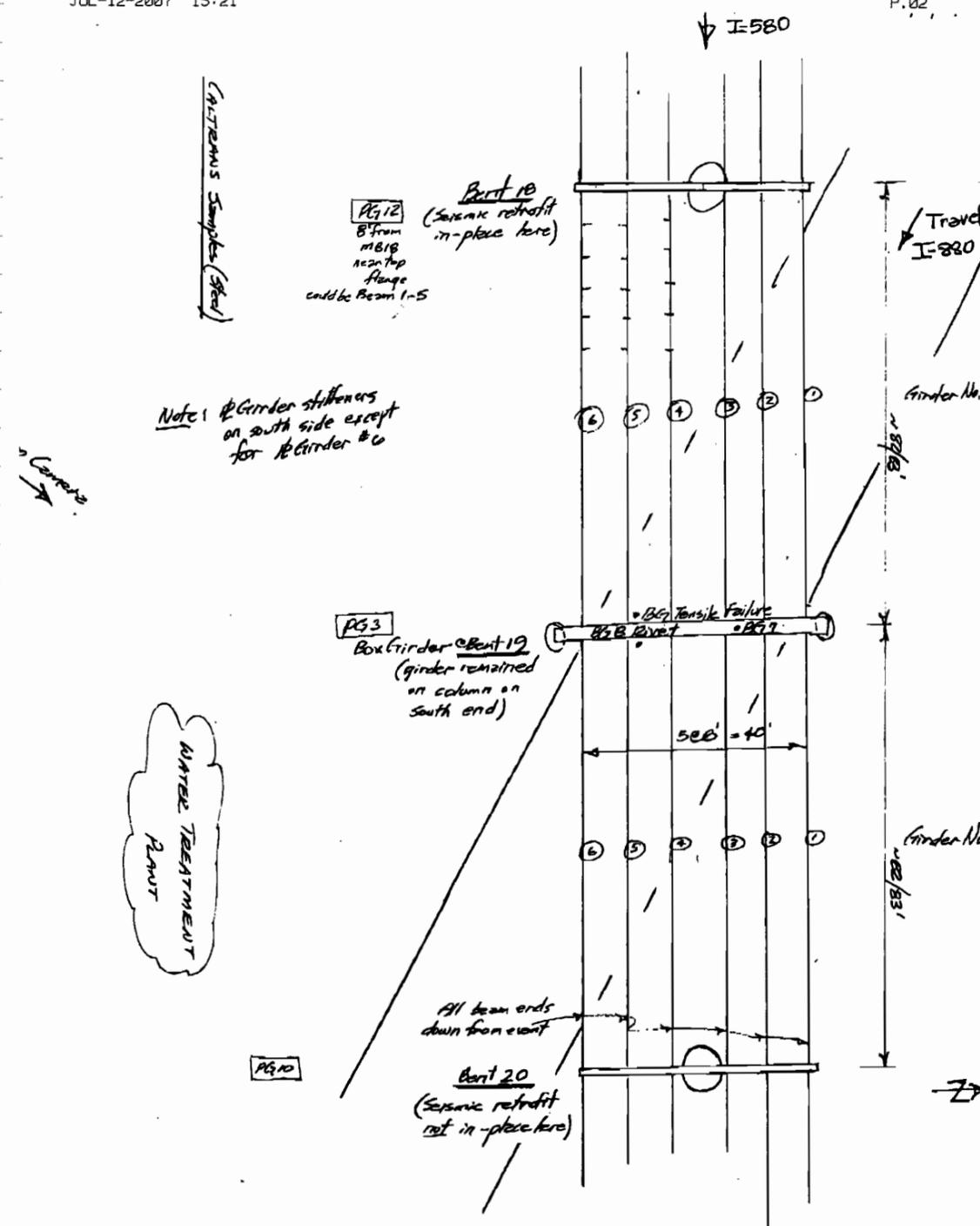
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7/9/07

JUL-12-2007 15:21

P.02



Recorded by: _____

Date

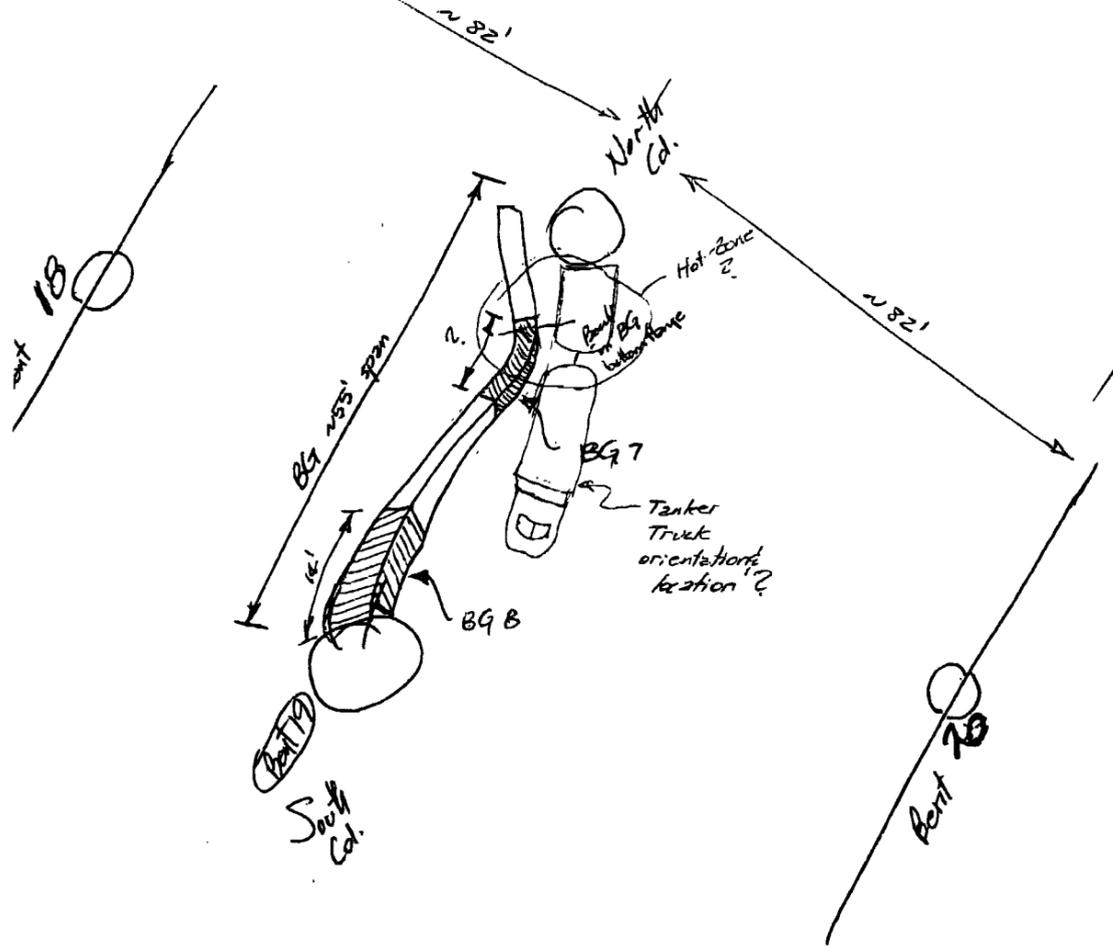
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Water Treatment Plant

Recorded by:

[Signature]

Date

8/10/07

Verified by:

Date

MICROSTRUCTURE EXAMINATION

The microstructural examination of the specimens is documented on the following pages.

samples were polished and etched with NITAL

Microstructure examined using optical microscope OM (D) 8/24/07

microscope OLYMPUS PM3

MINGS 50x, 100x, 200x, 1000x

SEM-EDS PHILIPS SEM XL-40 WITH 4PI EDS SYSTEM

AMRAY 1645T WITH KEVEX EDS

XRD SIGMA MODEL 805

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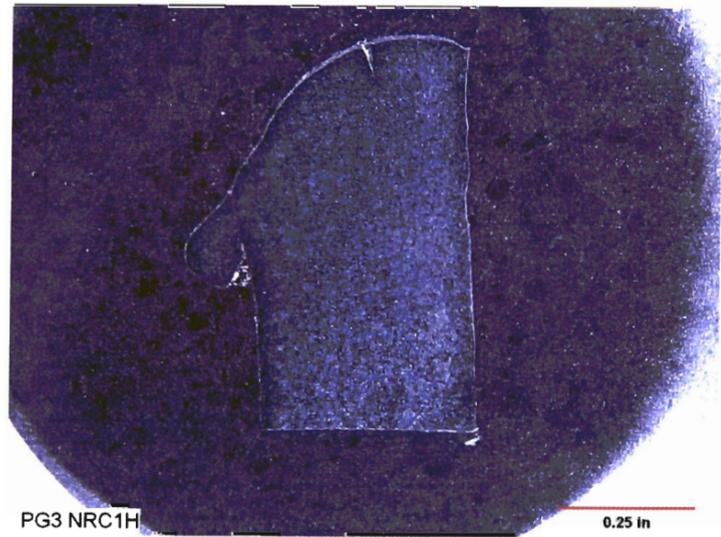
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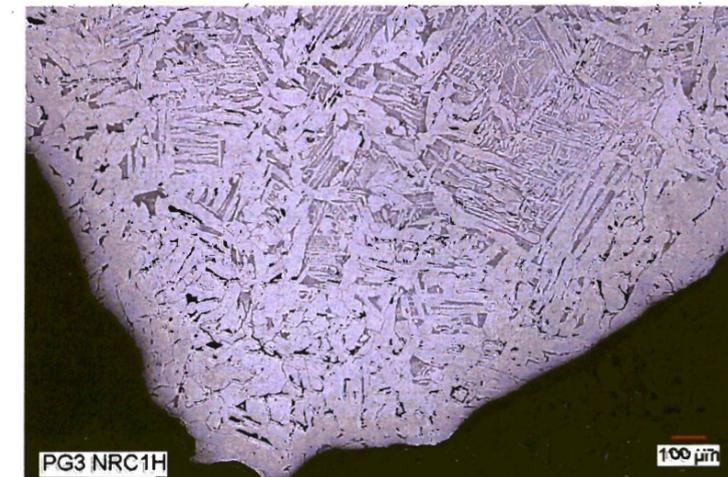
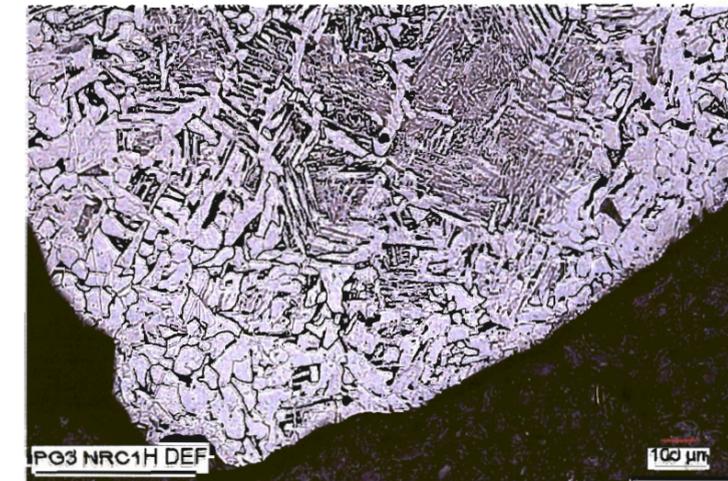


Recorded by: *David D*

Date: 8/24/07

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Date

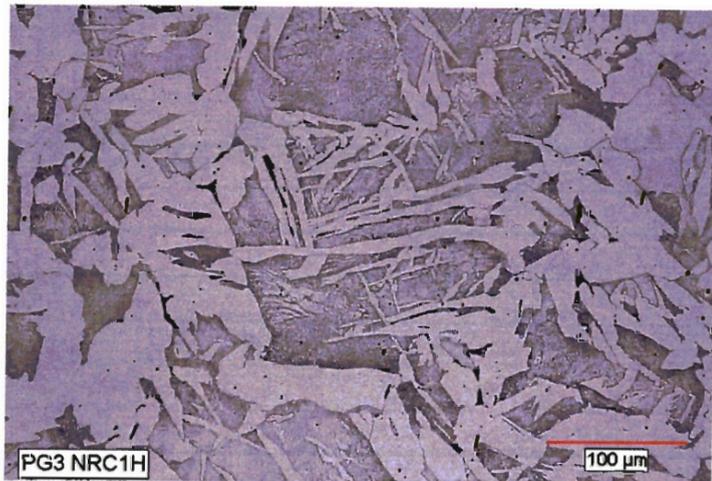
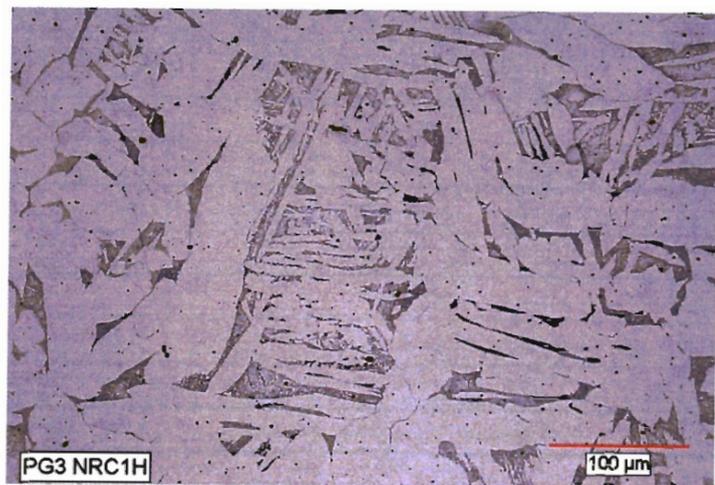


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Date: 8/24/07

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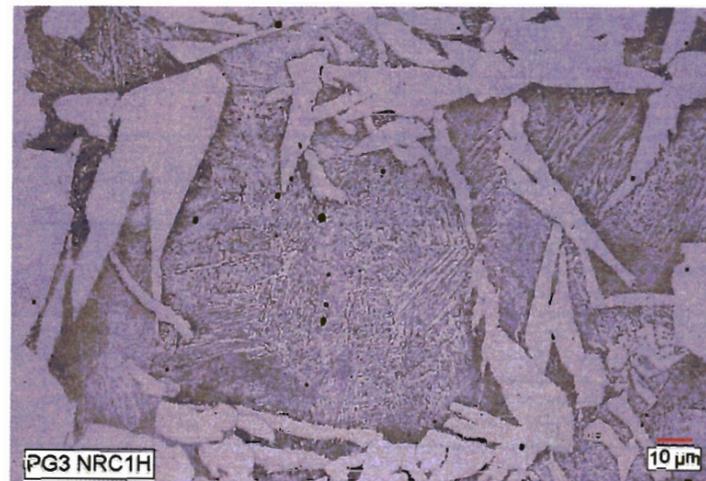
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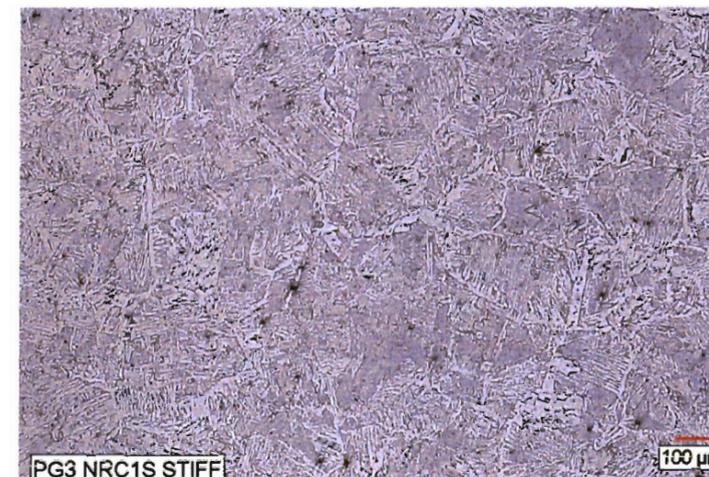
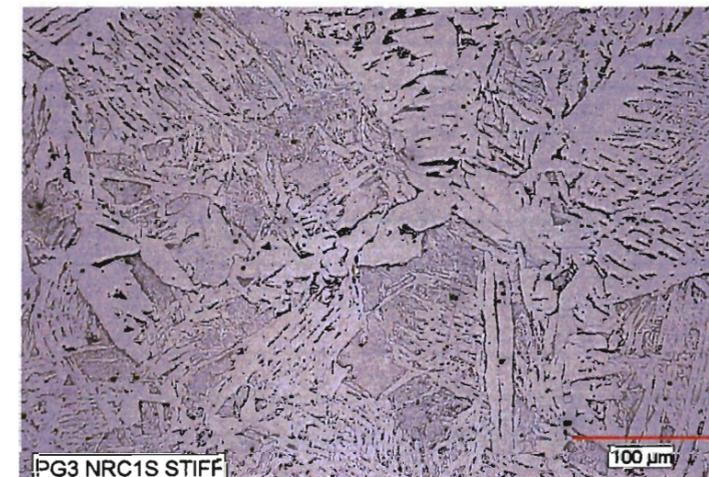
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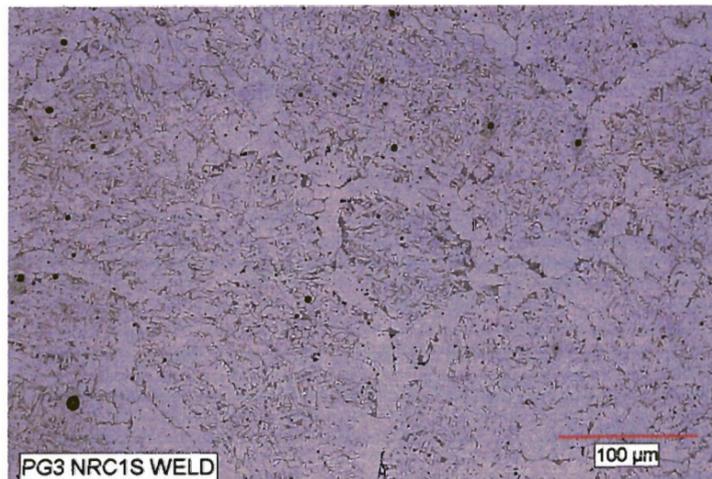
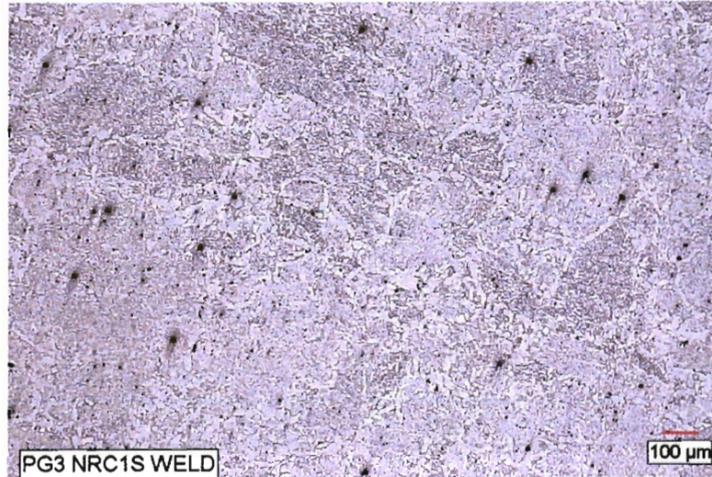
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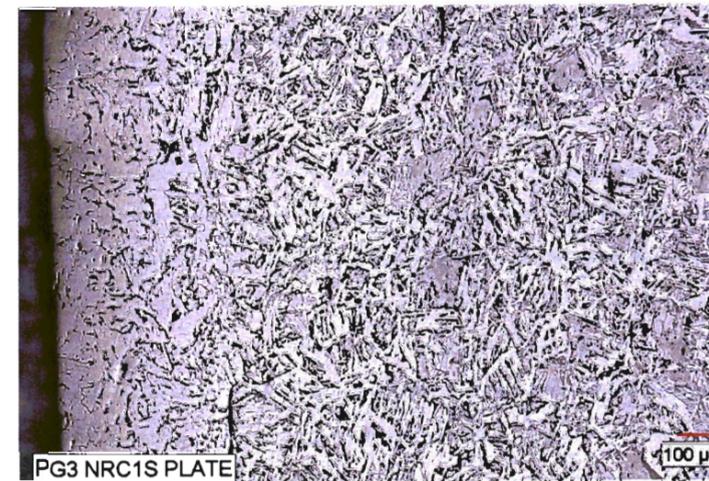
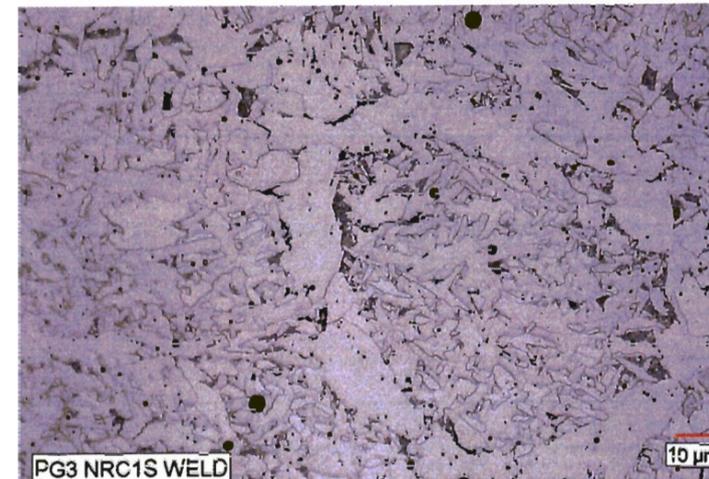


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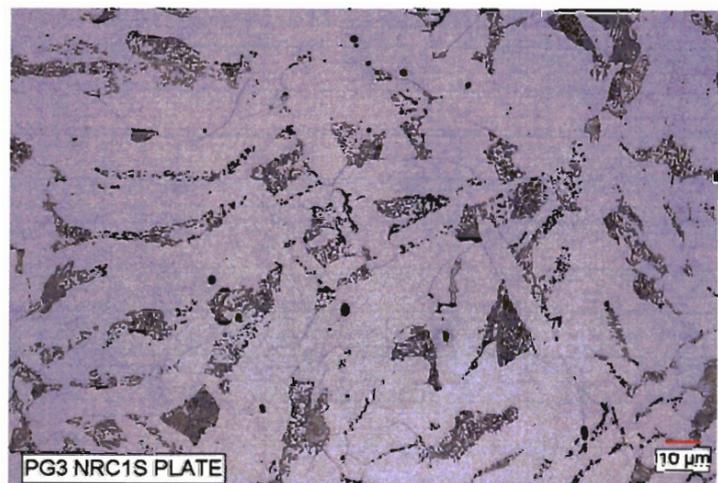
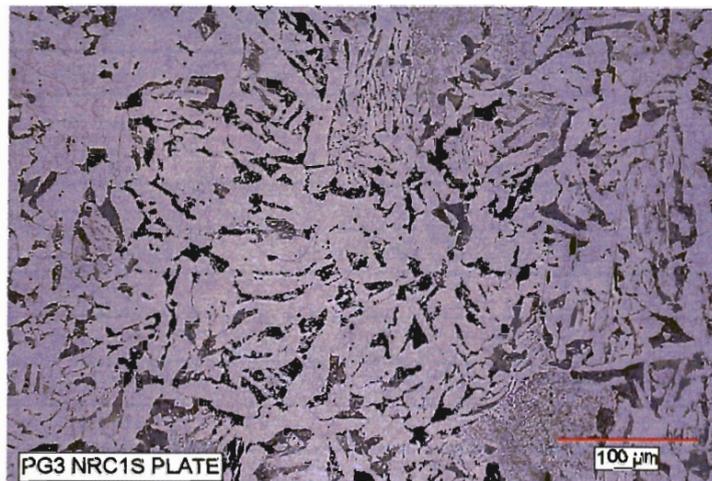


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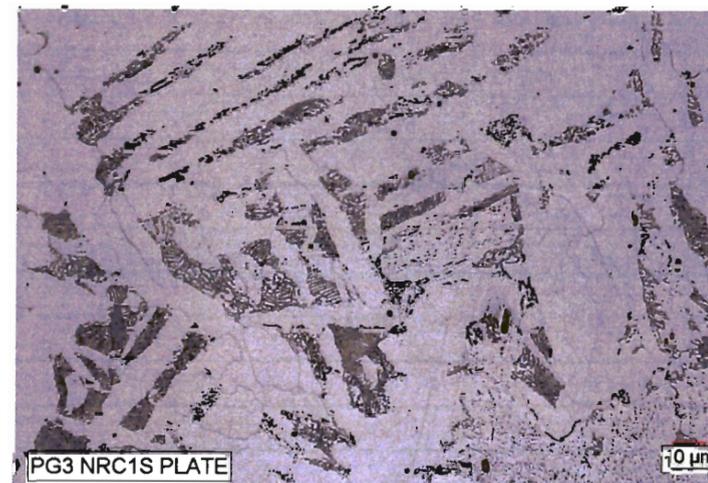
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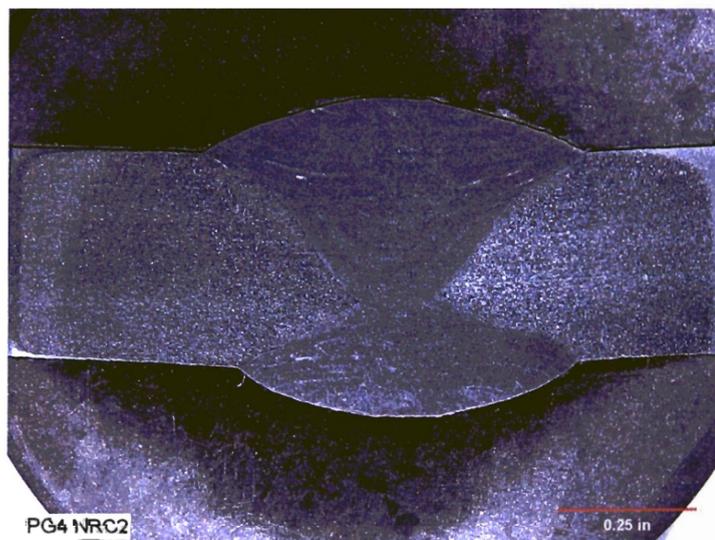
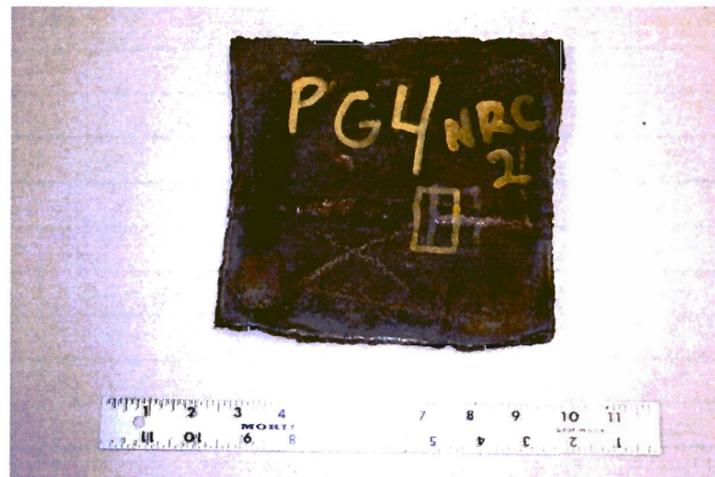
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Sample NRC 2 from PG4

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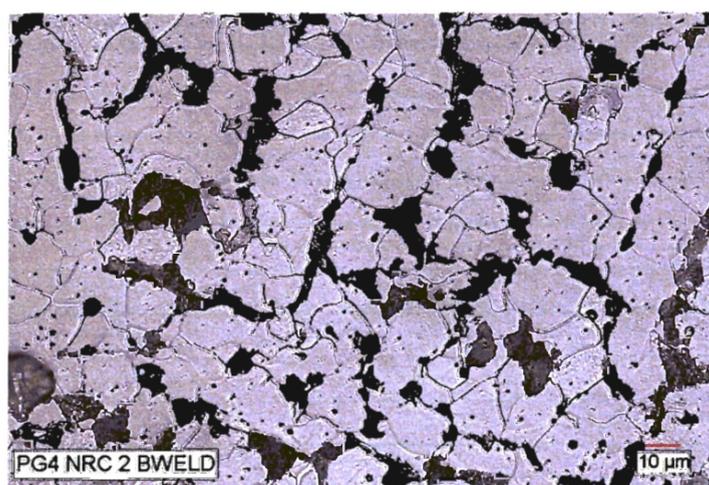
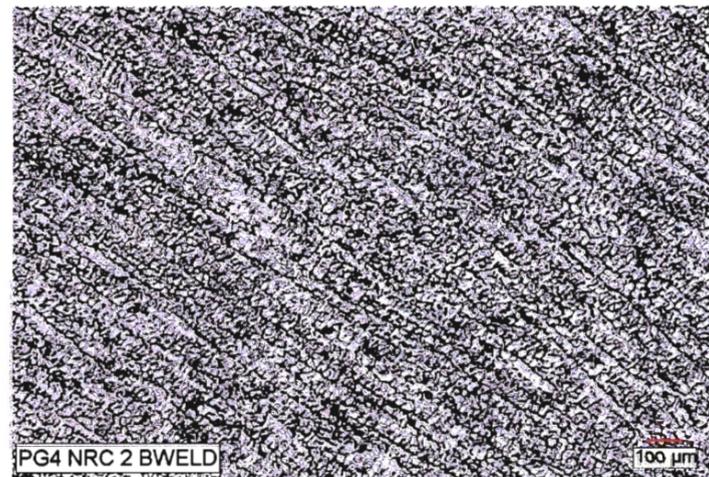
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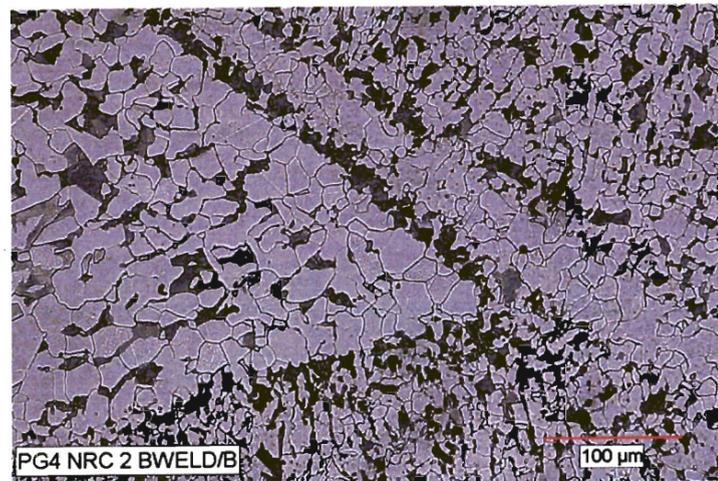
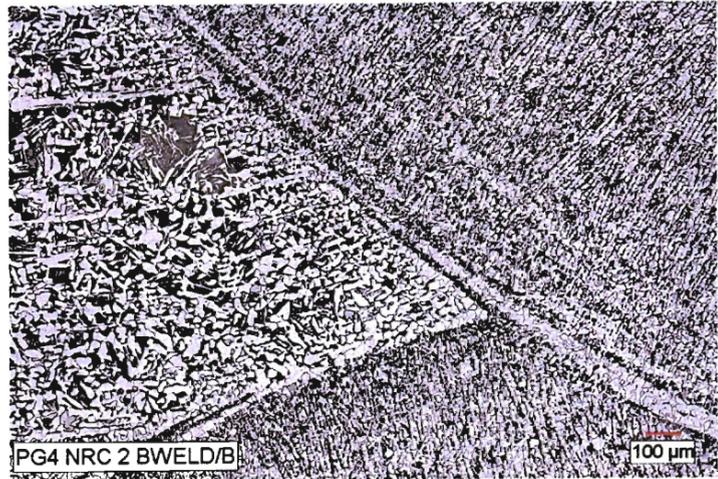
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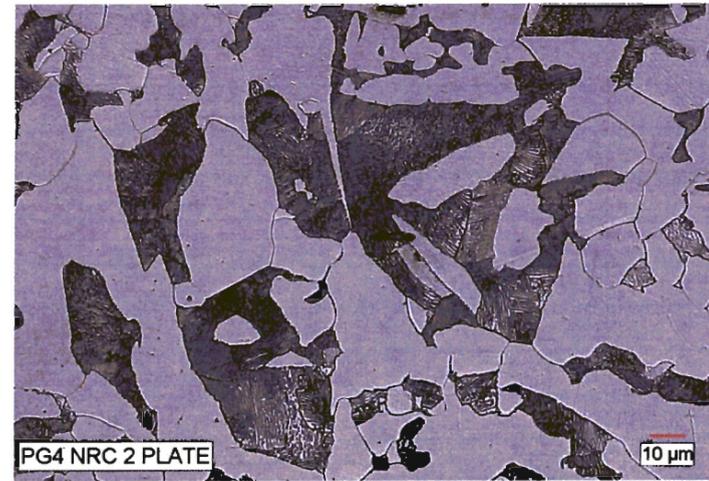
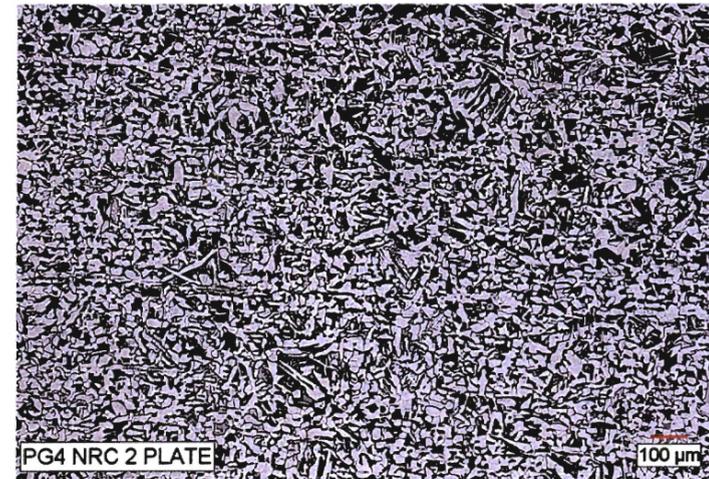


Recorded by: *Paul D.*

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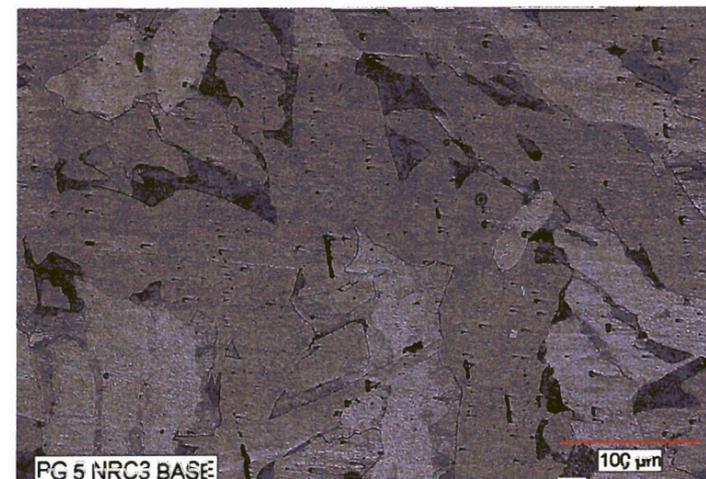
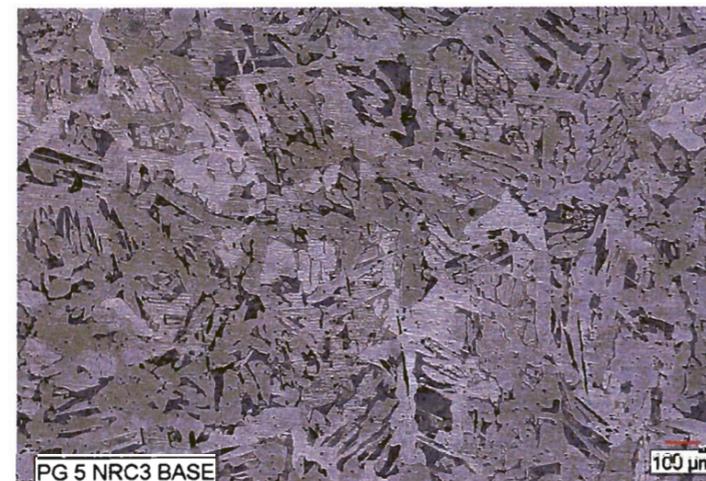
Paul Q

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8/24/07

Verified by:

Date



Recorded by:

Paul Q

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8/24/07

Verified by:

Date



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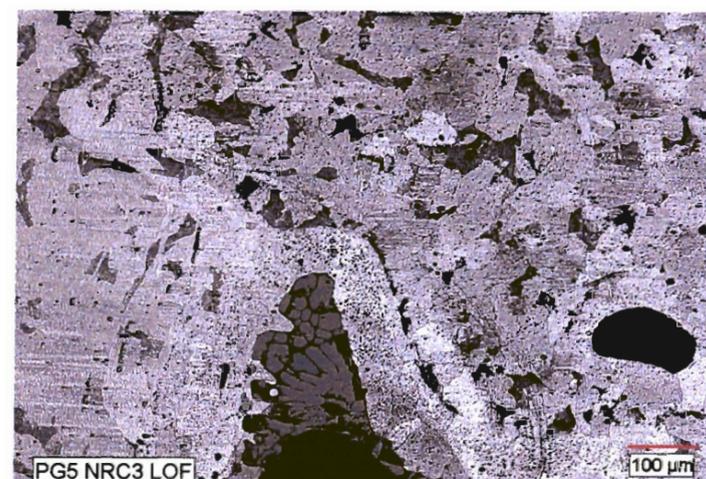
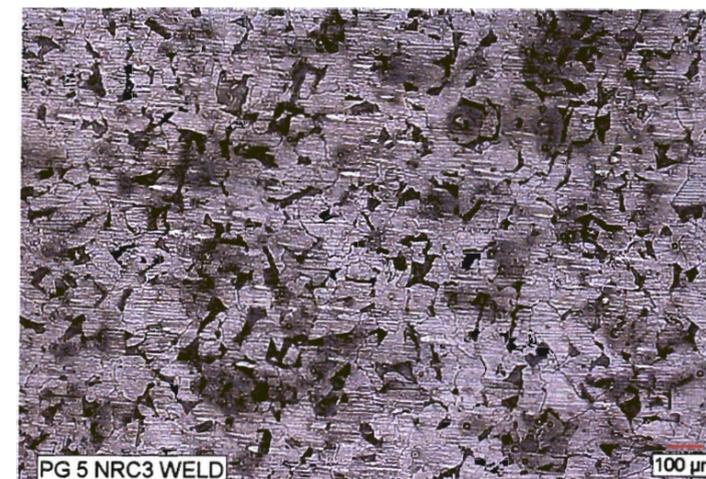
Paul D

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Date



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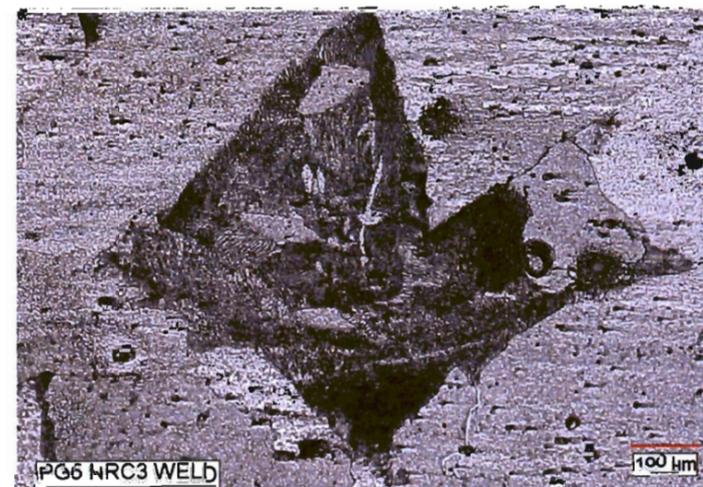
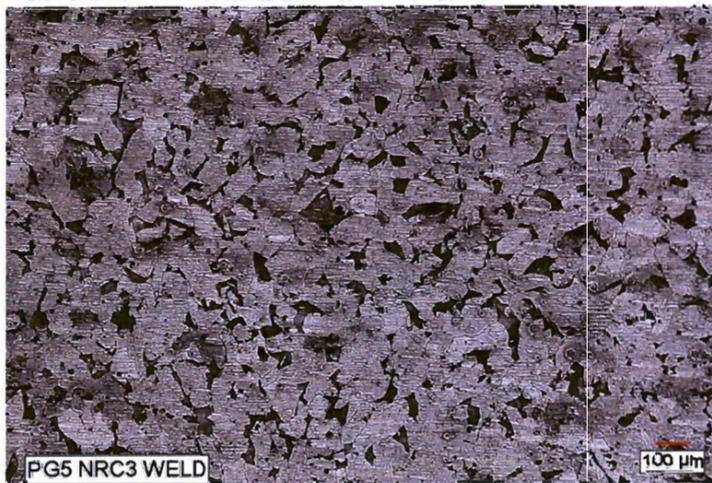
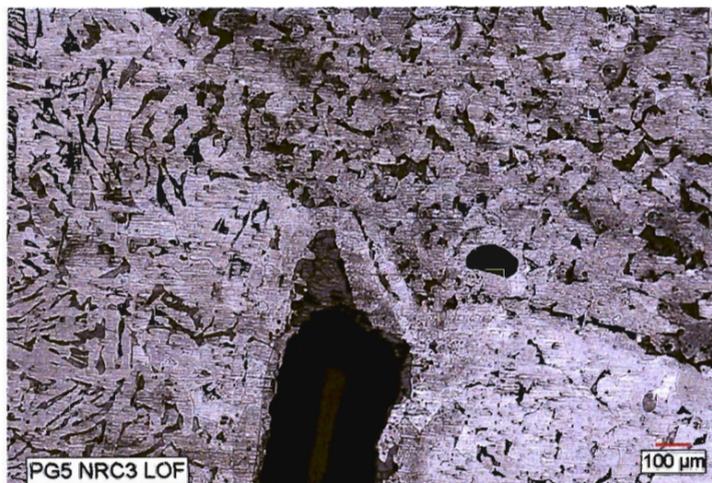
Paul D

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8/24/07

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Date



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Date: 8/24/07

Verified by: _____

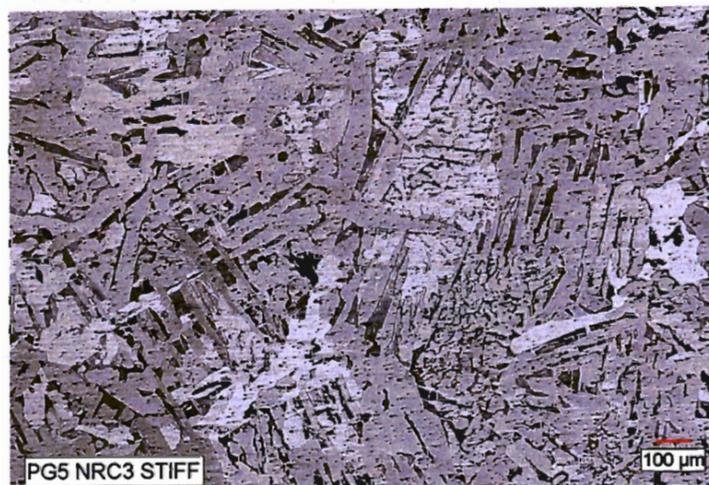
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Date: 8/24/07

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8/24/07

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[Signature]

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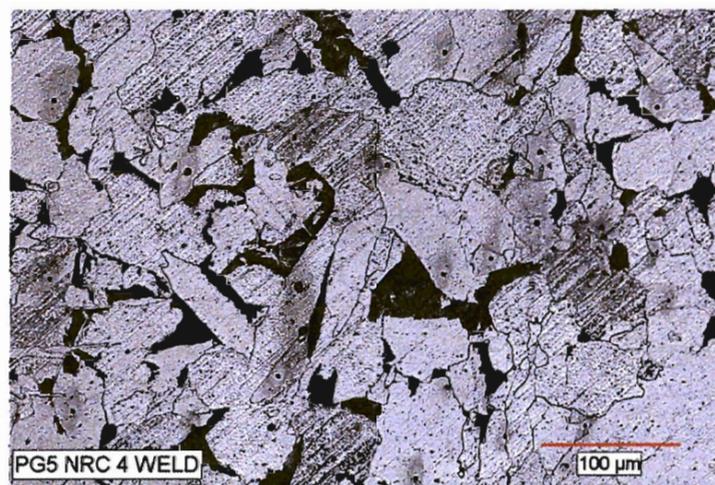
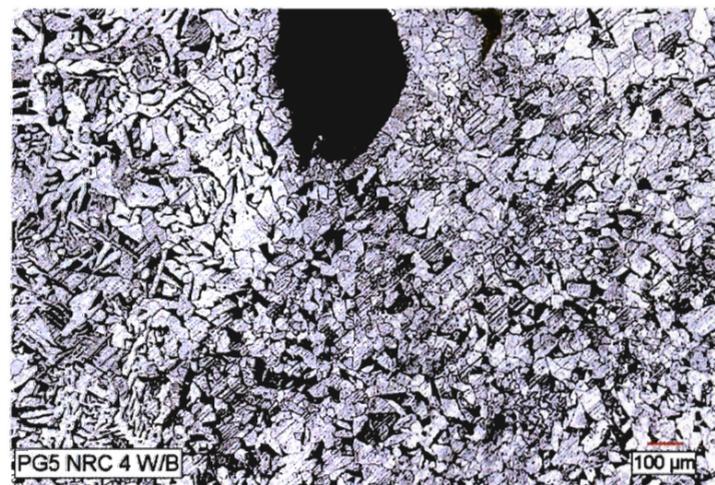
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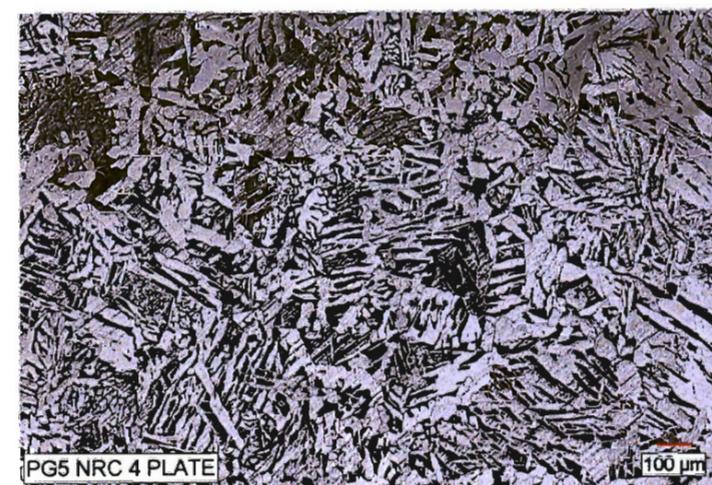
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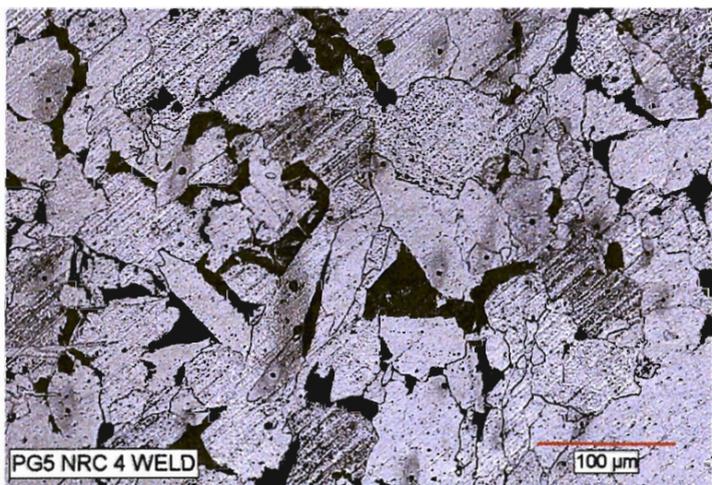
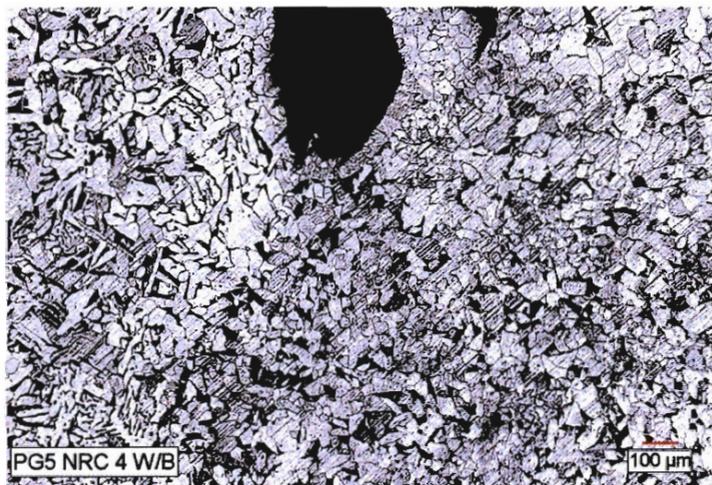
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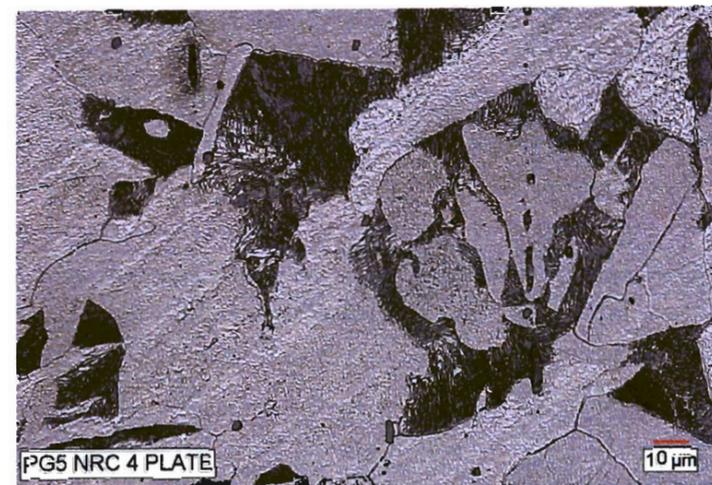
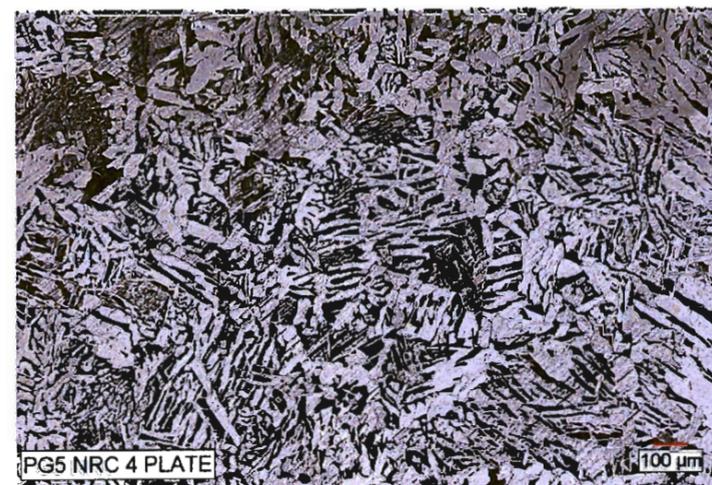
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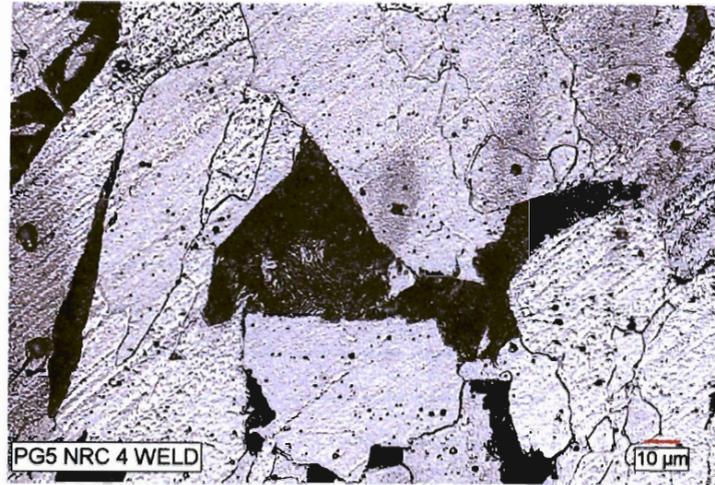
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Date



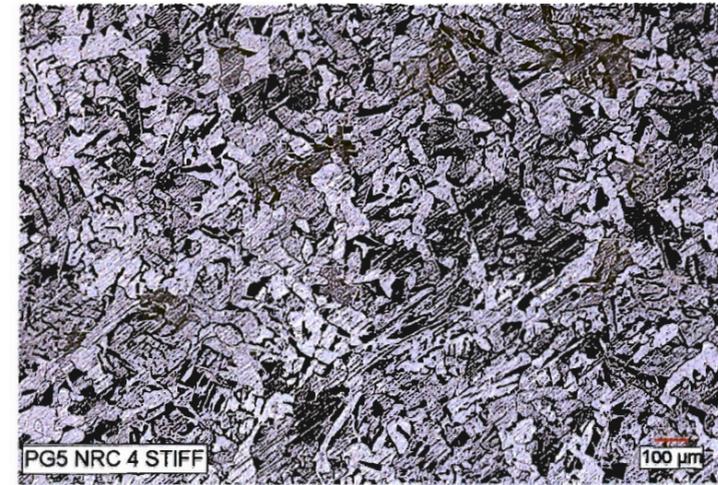
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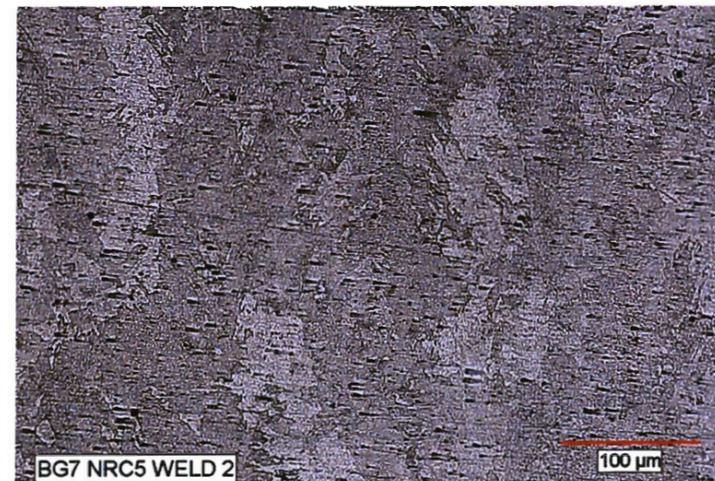


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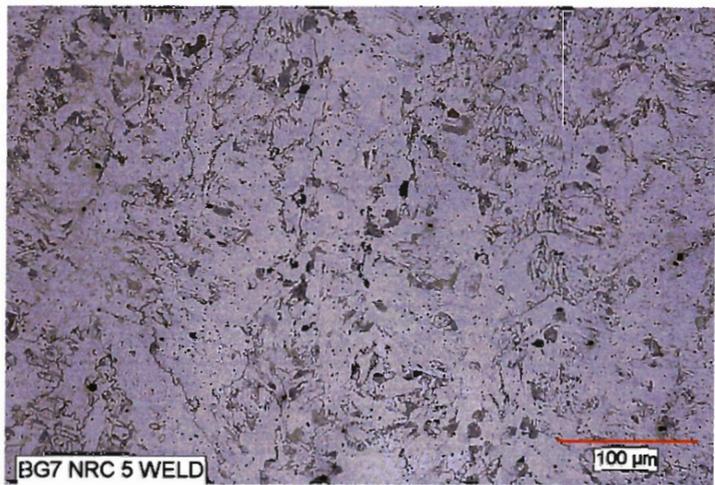
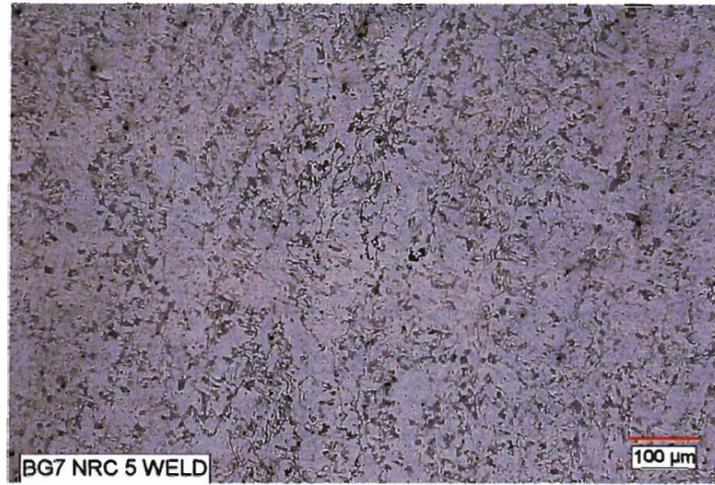


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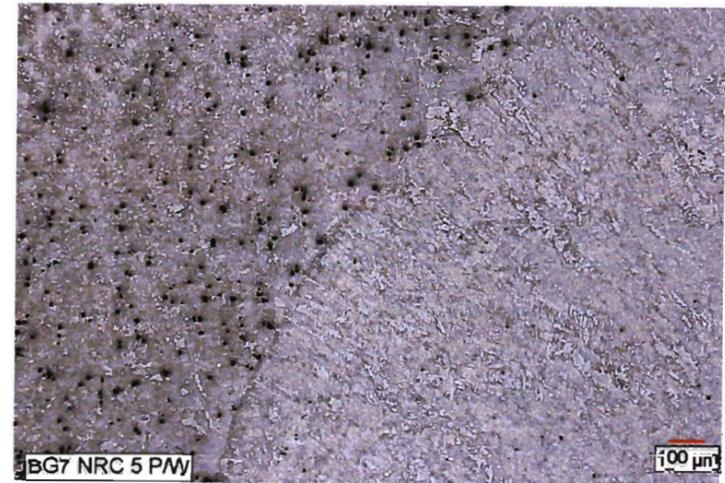
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Date



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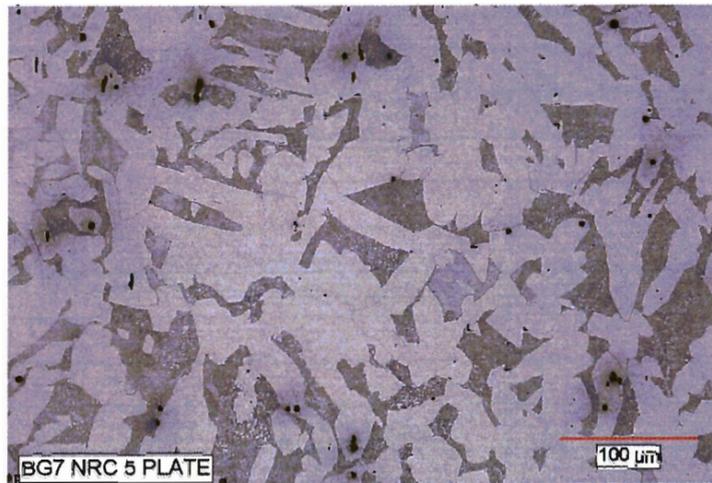


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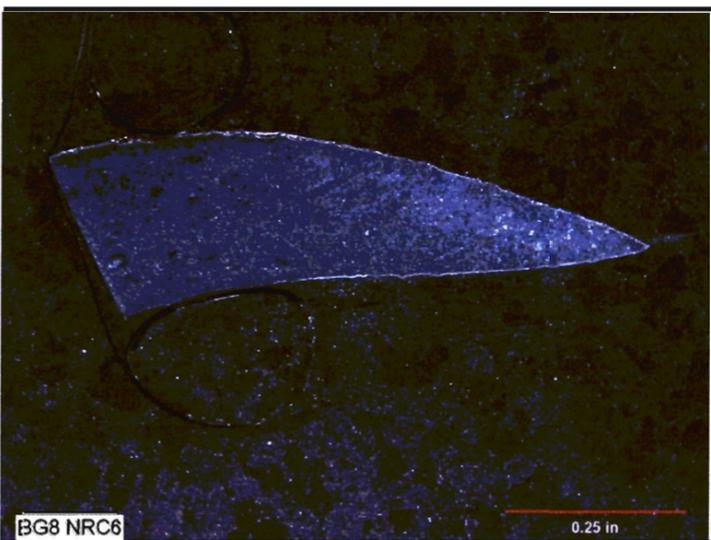


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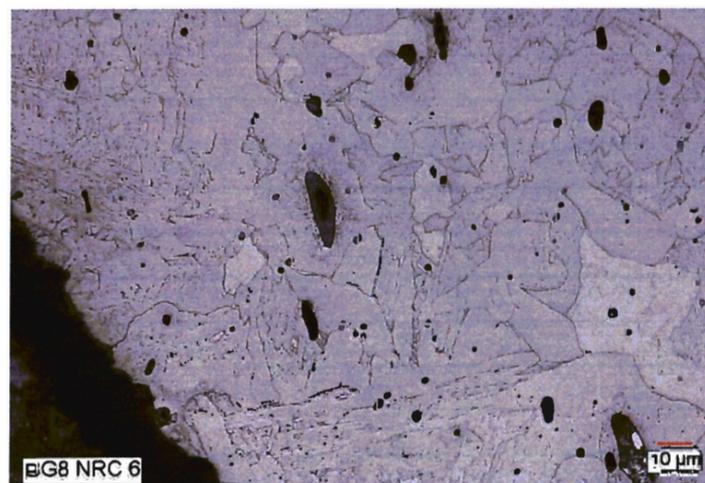
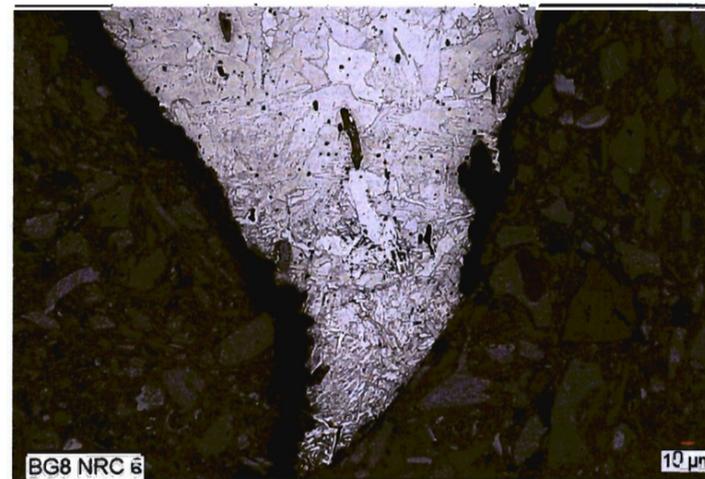


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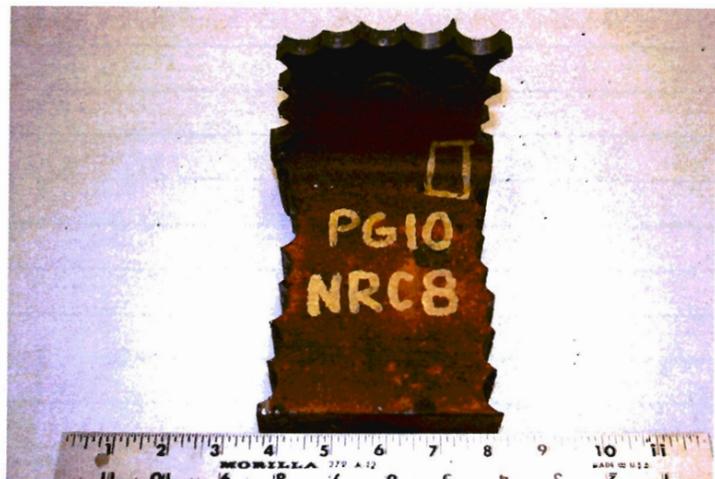


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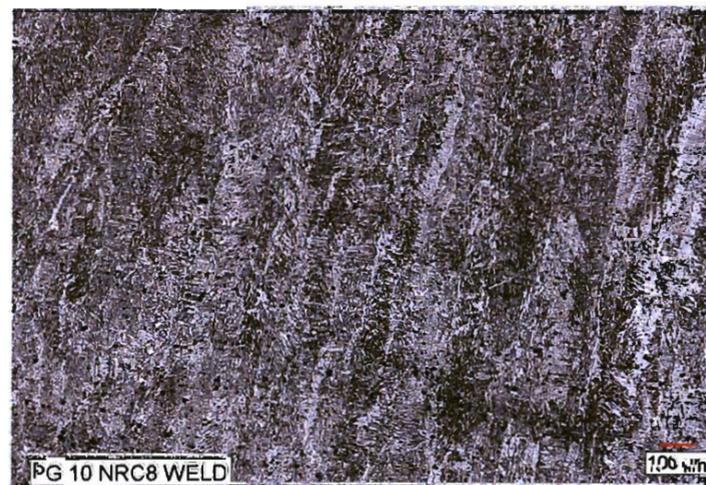
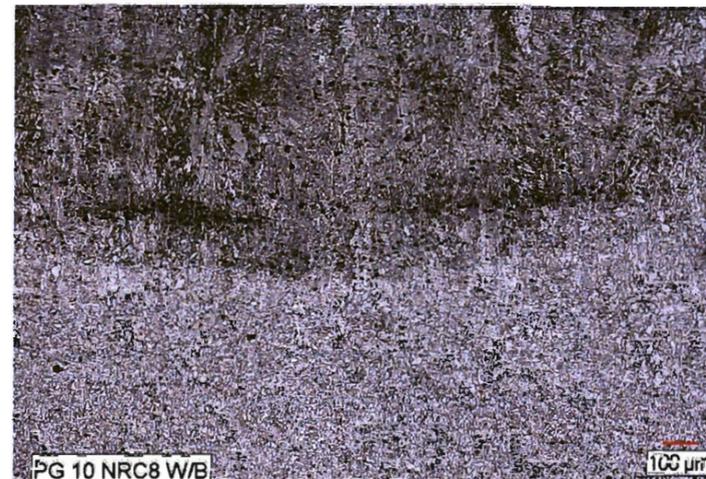


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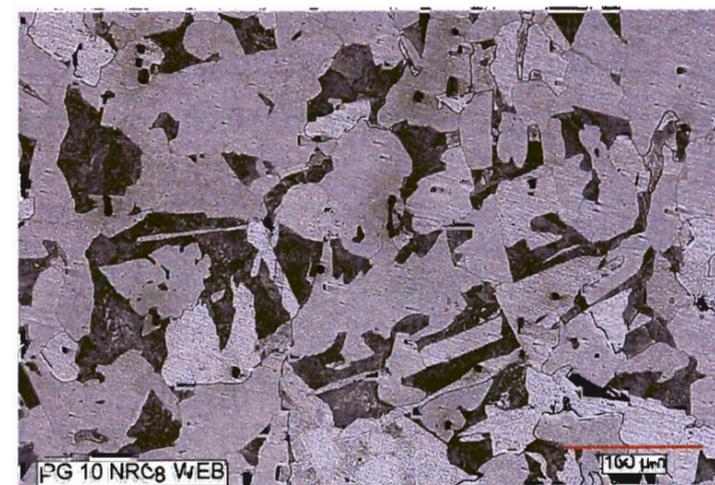


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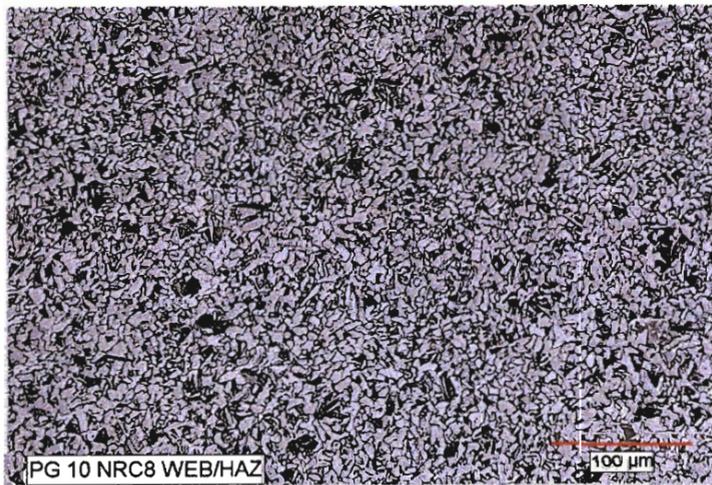


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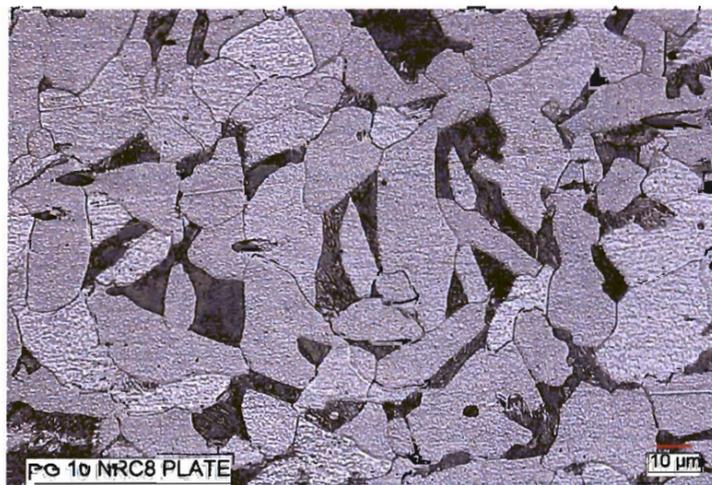
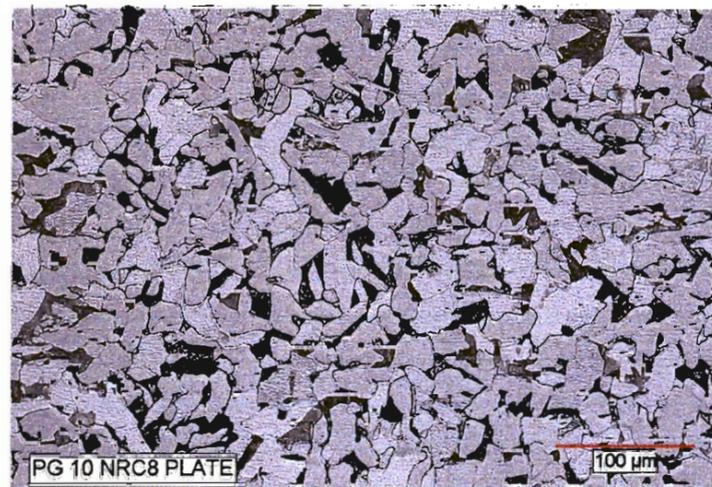


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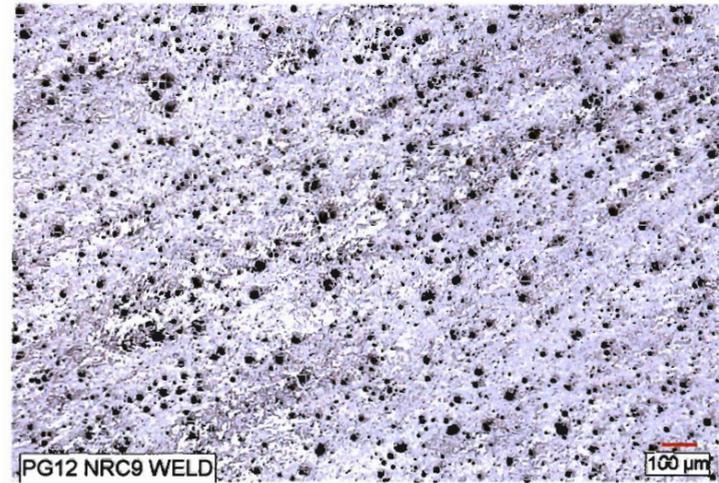
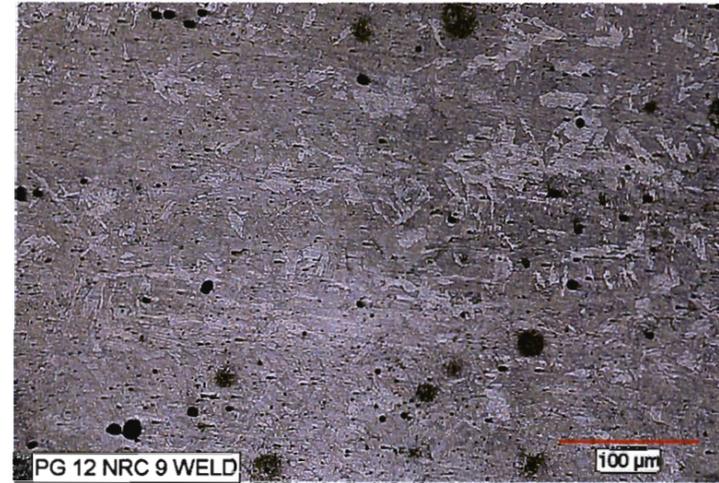
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