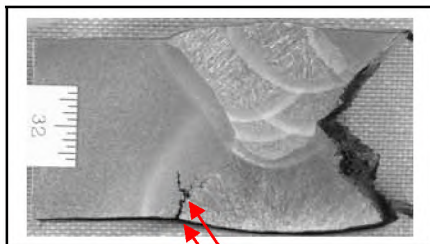
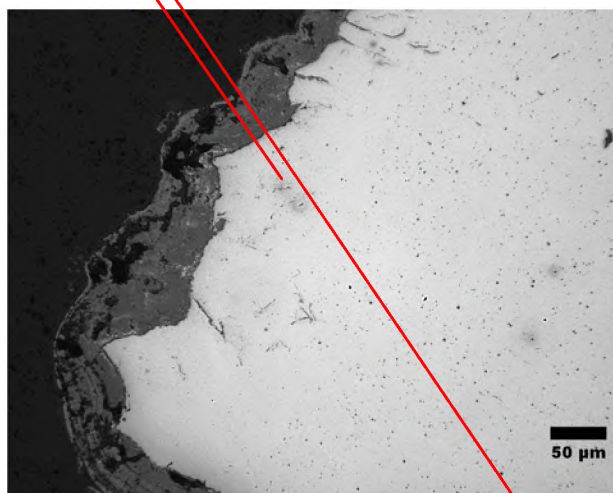


| | | |
|--|---|-------------------------------|
| BETA LAB No.M10198- LS3 TOP | TESORO REFINING AND MARKETING COMPANY ANACORTES REFINERY 10200 W. MARCH POINT ROAD T91WA4428 ANACORTES, WA 98221 | CUSTOMER P.O. No.: 4501667904 |
| PART: 6600-E HEAT EXCHANGER LS 3 TOP PART 15 | | DATE: SEPTEMBER 20, 2010 |
| PAGE 27 OF 53 | | |

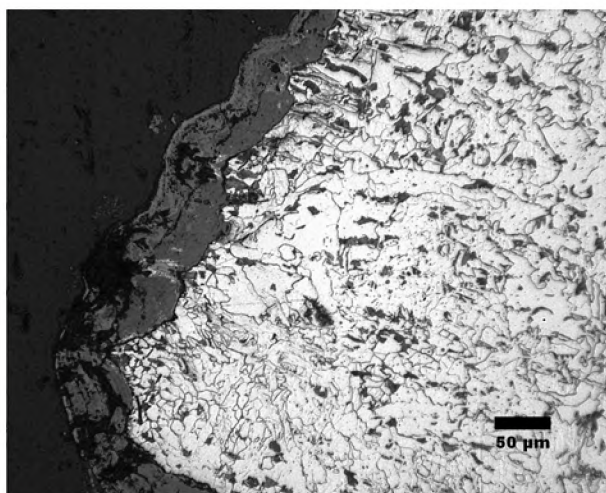


LABORATORY REPORT-LS3 TOP

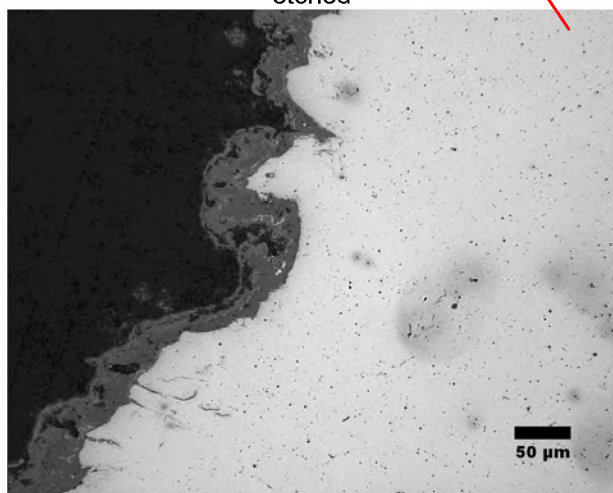
MOUNT 15 M-4T
ID IS ON THE BOTTOM



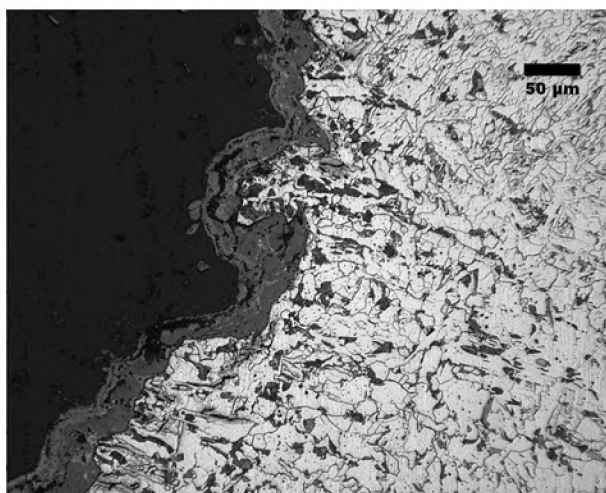
Wed toe at the weld metal side of the crack, un-etched



Same as at left, etched



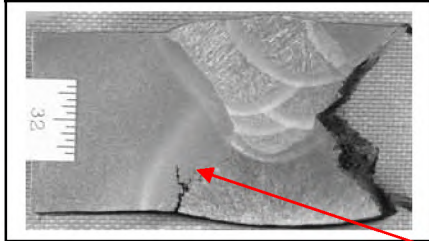
One field up along the crack edge, un-etched



Same as at left, etched

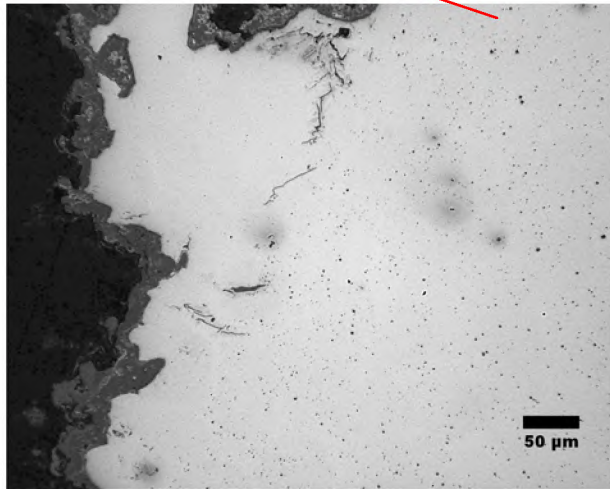
Figure 22

| | | |
|--|---|-------------------------------|
| BETA LAB No.M10198- LS3 TOP | TESORO REFINING AND MARKETING COMPANY ANACORTES REFINERY 10200 W. MARCH POINT ROAD T91WA4428 ANACORTES, WA 98221 | CUSTOMER P.O. No.: 4501667904 |
| PART: 6600-E HEAT EXCHANGER LS 3 TOP PART 15 | | DATE: SEPTEMBER 20, 2010 |
| | | PAGE 28 OF 53 |

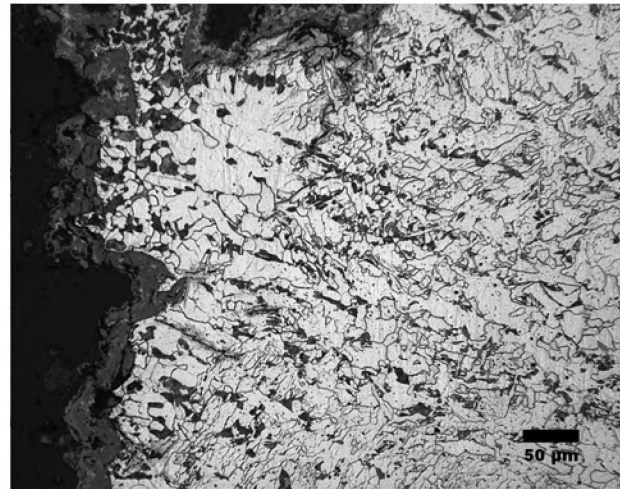


LABORATORY REPORT-LS3 TOP

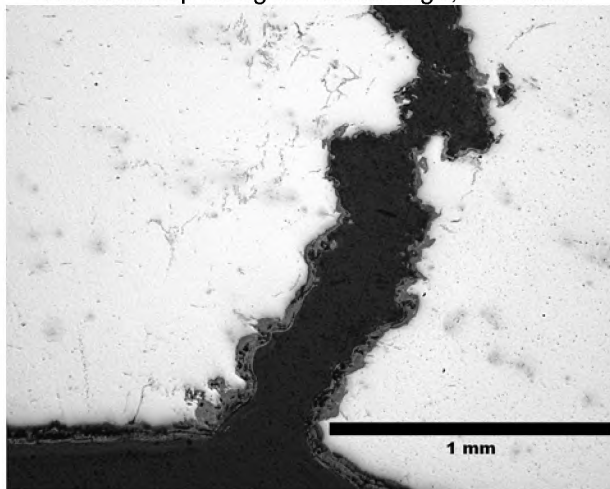
MOUNT 15 M-4T
ID IS ON THE BOTTOM



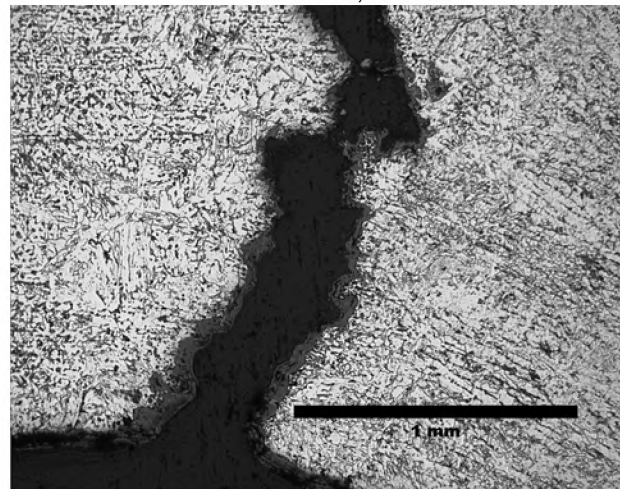
Two fields up along the crack edge, un-etched



Same as at left, etched



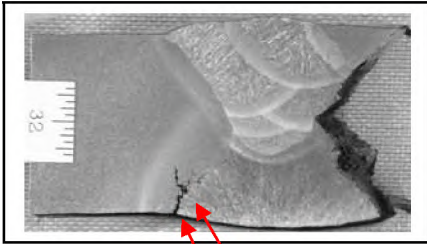
Both sides of the crack at ID. Un-etched



Same as at left, etched

Figure 23

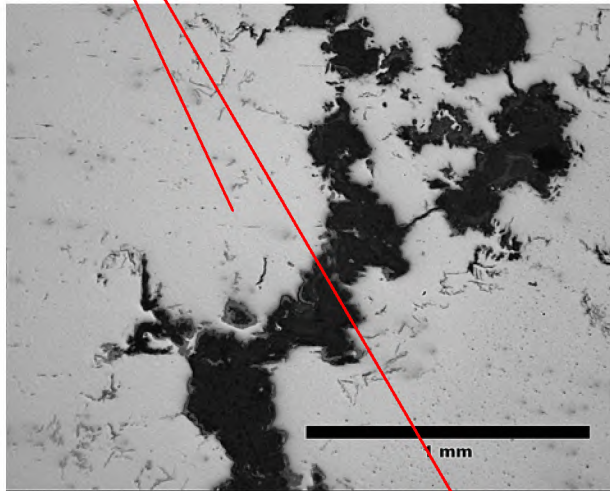
| | | |
|--|---|-------------------------------|
| BETA LAB No.M10198- LS3 TOP | TESORO REFINING AND MARKETING COMPANY ANACORTES REFINERY 10200 W. MARCH POINT ROAD T91WA4428 ANACORTES, WA 98221 | CUSTOMER P.O. No.: 4501667904 |
| PART: 6600-E HEAT EXCHANGER LS 3 TOP PART 15 | | DATE: SEPTEMBER 20, 2010 |
| | | PAGE 29 OF 53 |



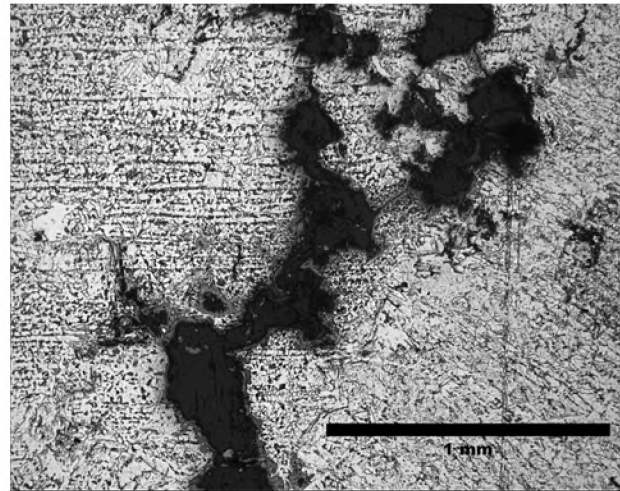
LABORATORY REPORT-LS3 TOP

MOUNT 15 M-4T

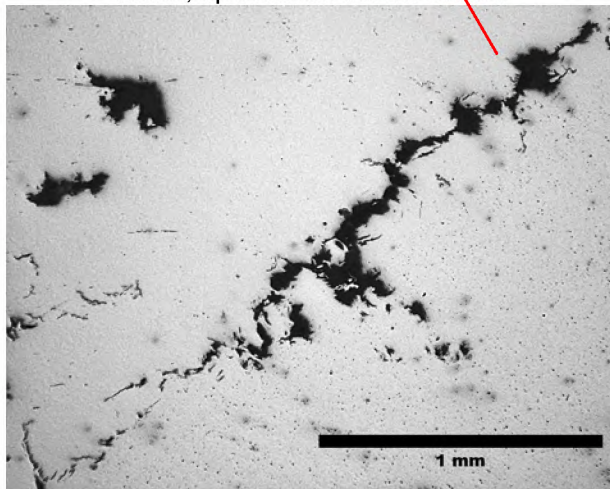
ID IS ON THE BOTTOM



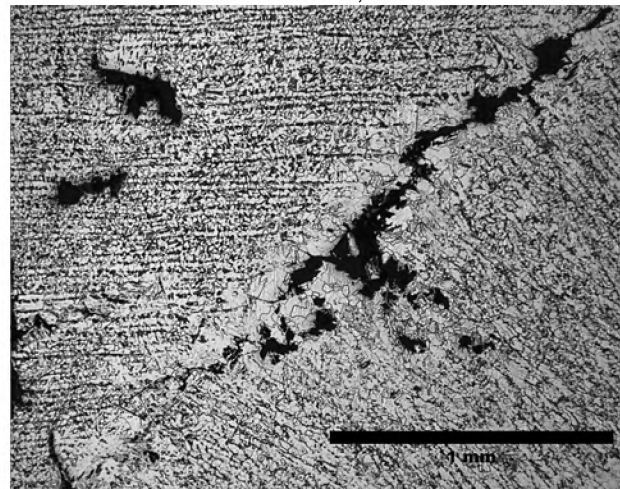
Crack, up from the ID. Un-etched



Same as at left, etched



Tip of the crack along fusion line, un-etched

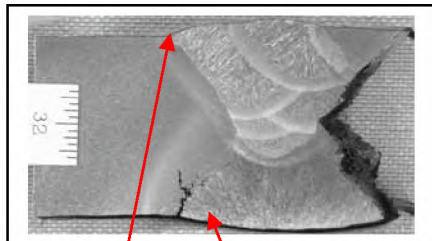


Same as at left, etched

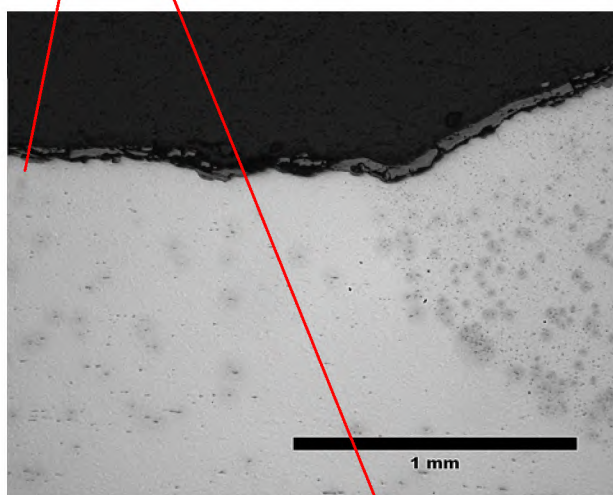
Figure 24

| | | |
|--|---|-------------------------------|
| BETA LAB No.M10198- LS3 TOP | TESORO REFINING AND MARKETING COMPANY ANACORTES REFINERY 10200 W. MARCH POINT ROAD T91WA4428 ANACORTES, WA 98221 | CUSTOMER P.O. No.: 4501667904 |
| PART: 6600-E HEAT EXCHANGER LS 3 TOP PART 15 | | DATE: SEPTEMBER 20, 2010 |
| PAGE 30 OF 53 | | |

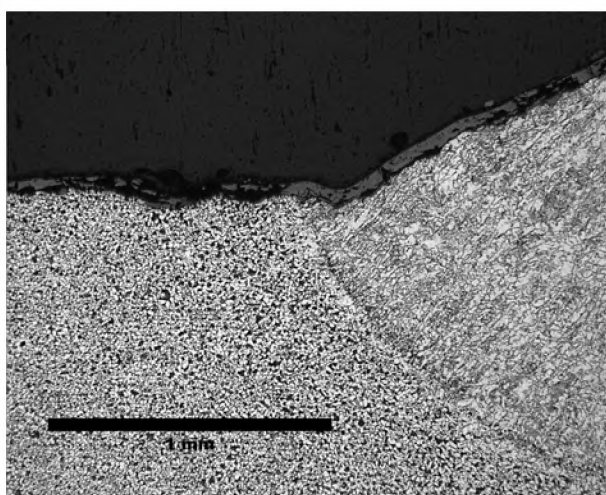
LABORATORY REPORT-LS3 TOP



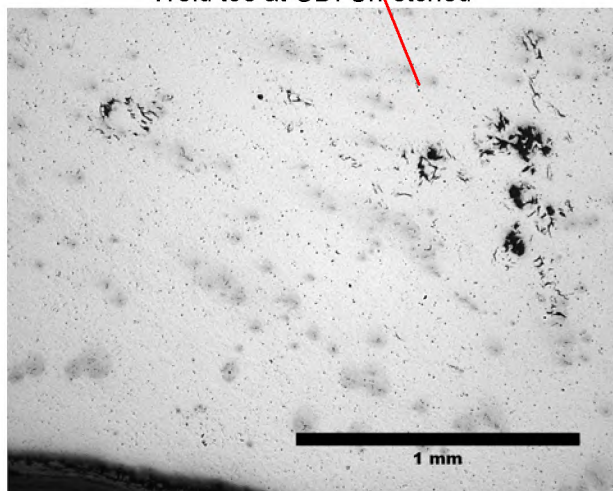
**MOUNT 15 M-4T
ID IS ON THE BOTTOM**



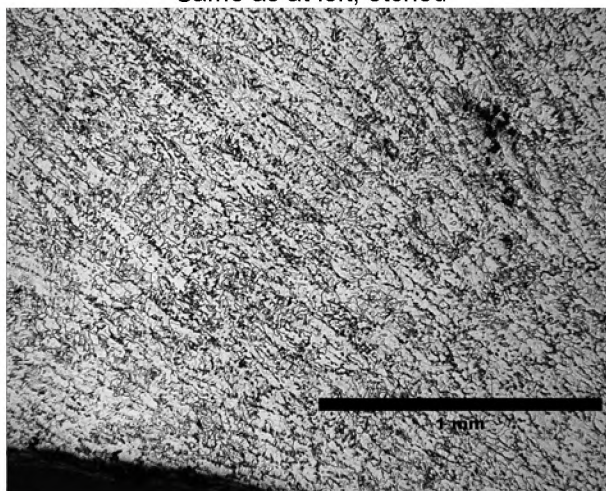
Weld toe at OD. Un-etched



Same as at left, etched



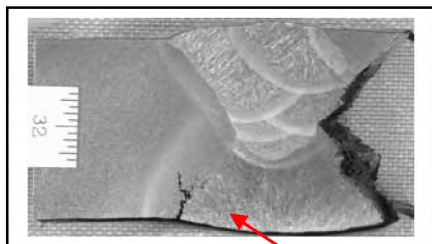
Cracks in the Weld Metal, un-etched



Same as at left, etched

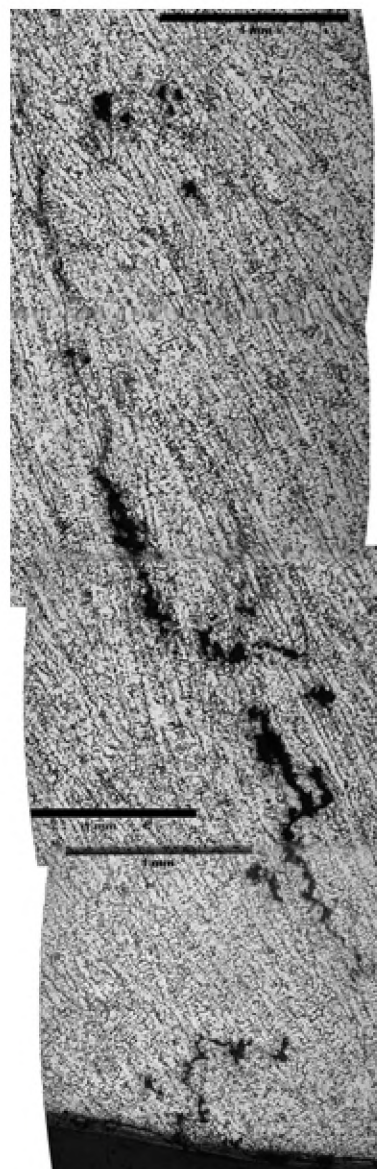
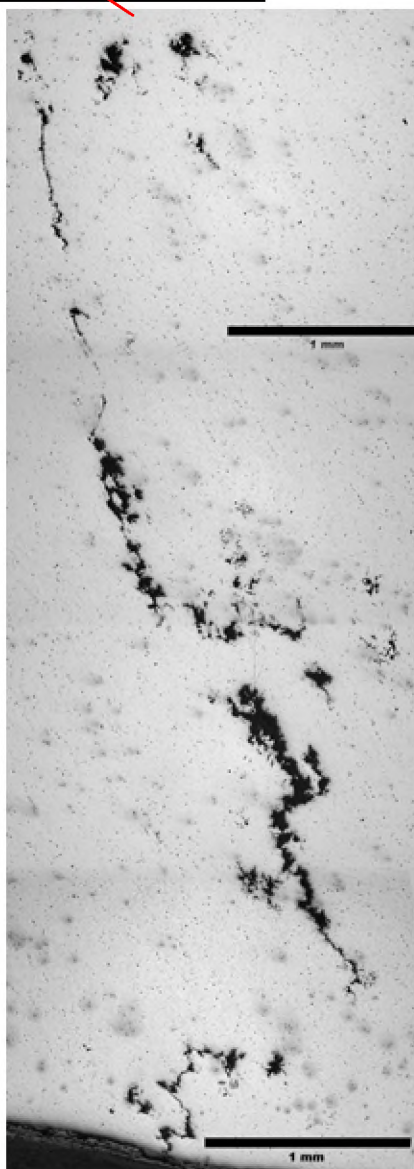
Figure 25

| | | |
|--|---|-------------------------------|
| BETA LAB No.M10198- LS3 TOP | TESORO REFINING AND MARKETING COMPANY ANACORTES REFINERY | CUSTOMER P.O. No.: 4501667904 |
| PART: 6600-E HEAT EXCHANGER LS 3 TOP PART 15 | 10200 W. MARCH POINT ROAD T91WA4428 ANACORTES, WA 98221 | DATE: SEPTEMBER 20, 2010 |
| PAGE 31 OF 53 | | |



LABORATORY REPORT-LS3 TOP

MOUNT 15 M-4T
ID IS ON THE BOTTOM



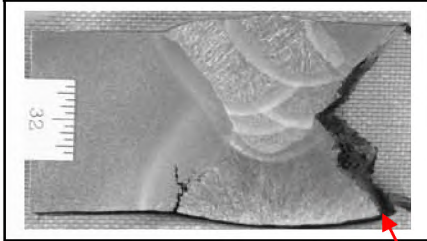
One of the cracks in the Weld Metal. Four microphotographs stitched together. Un-etched

Same as at left, etched

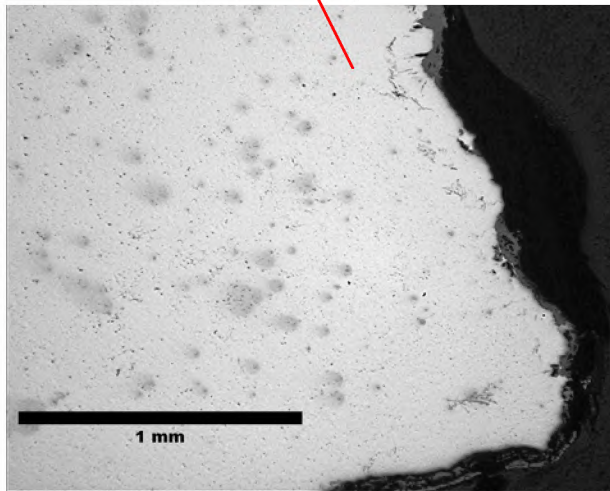
Figure 26

| | | |
|--|---|-------------------------------|
| BETA LAB No.M10198- LS3 TOP | TESORO REFINING AND MARKETING COMPANY ANACORTES REFINERY 10200 W. MARCH POINT ROAD T91WA4428 ANACORTES, WA 98221 | CUSTOMER P.O. No.: 4501667904 |
| PART: 6600-E HEAT EXCHANGER LS 3 TOP PART 15 | | DATE: SEPTEMBER 20, 2010 |
| | | PAGE 32 OF 53 |

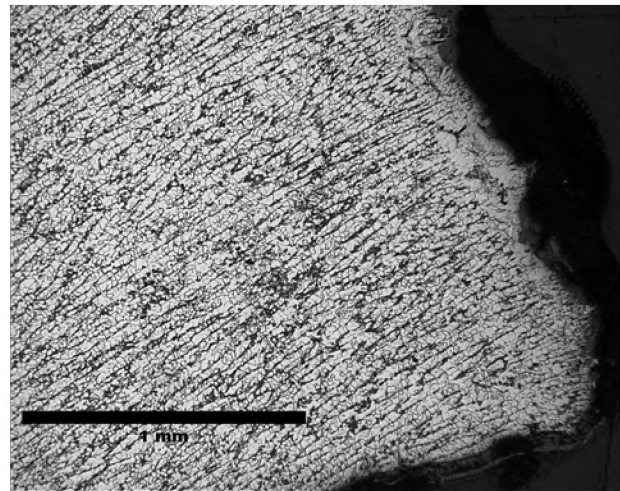
LABORATORY REPORT-LS3 TOP



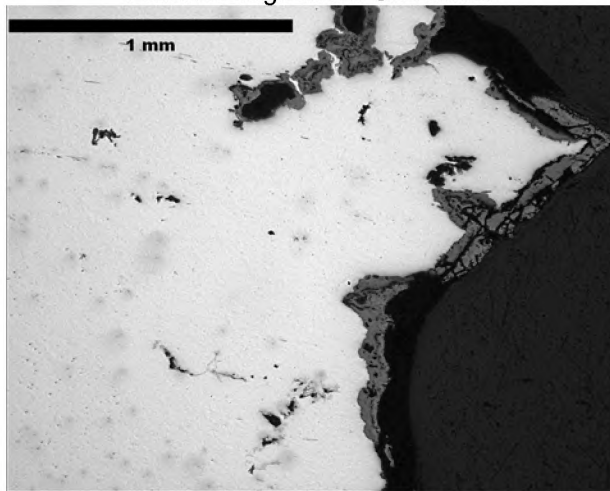
MOUNT 15 M-4T
ID IS ON THE BOTTOM



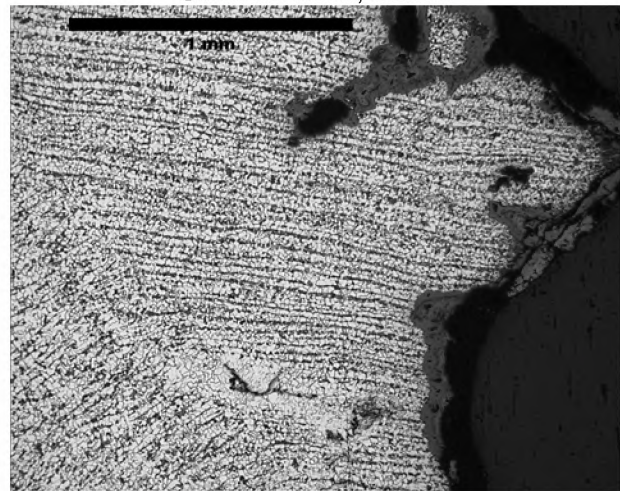
Fracture edge at ID. Un-etched



Same as at left, etched



Fracture edge, four fields up from ID, un-etched



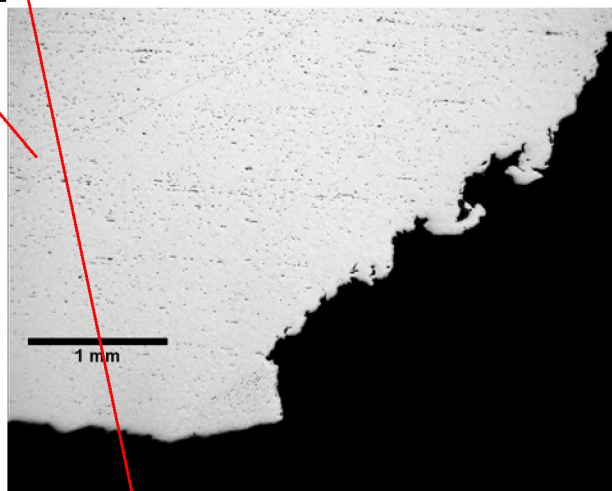
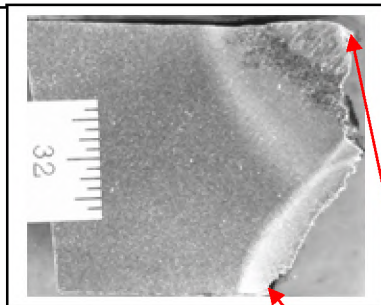
Same as at left, etched

Figure 27

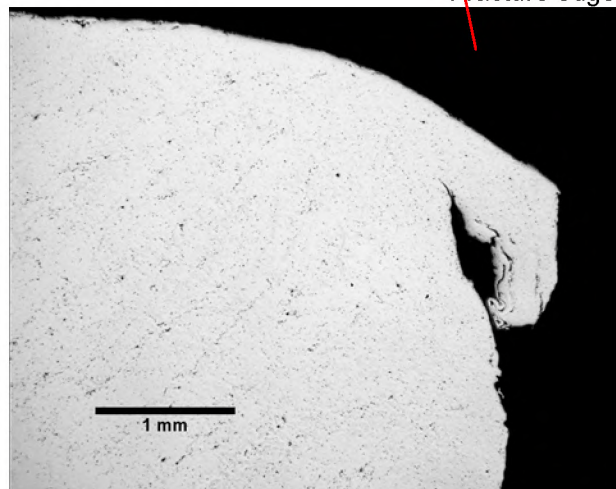
| | | |
|--|---|-------------------------------|
| BETA LAB No.M10198- LS3 TOP | TESORO REFINING AND MARKETING COMPANY ANACORTES REFINERY 10200 W. MARCH POINT ROAD T91WA4428 ANACORTES, WA 98221 | CUSTOMER P.O. No.: 4501667904 |
| PART: 6600-E HEAT EXCHANGER LS 3 TOP PART 15 | | DATE: SEPTEMBER 20, 2010 |
| | | PAGE 33 OF 53 |

LABORATORY REPORT-LS3 TOP

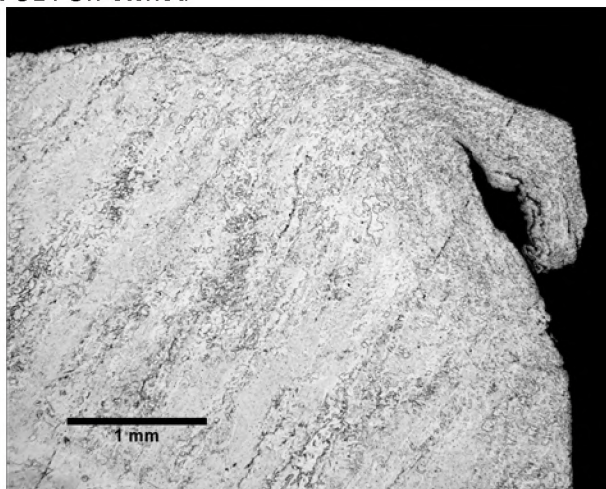
**MOUNT 15 TO
ID IS ON THE TOP**



Fracture edge at OD. Un-etched



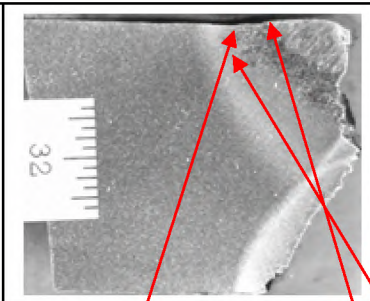
Fracture edge at ID. Un-etched



Same as at left. Etched

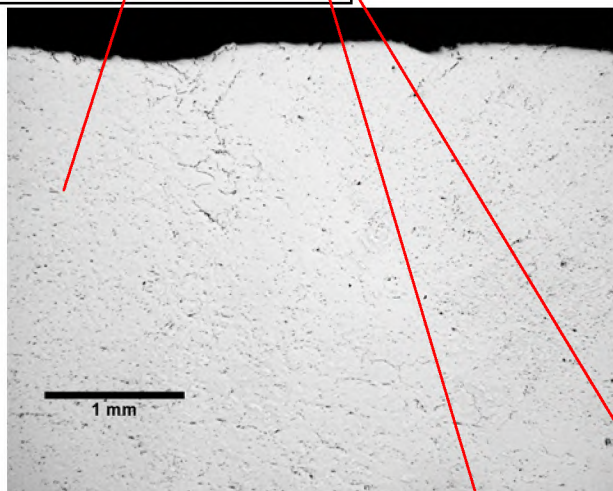
Figure 28

| | | |
|--|---|-------------------------------|
| BETA LAB No.M10198- LS3 TOP | TESORO REFINING AND MARKETING COMPANY ANACORTES REFINERY 10200 W. MARCH POINT ROAD T91WA4428 ANACORTES, WA 98221 | CUSTOMER P.O. No.: 4501667904 |
| PART: 6600-E HEAT EXCHANGER LS 3 TOP PART 15 | | DATE: SEPTEMBER 20, 2010 |
| PAGE 34 OF 53 | | |

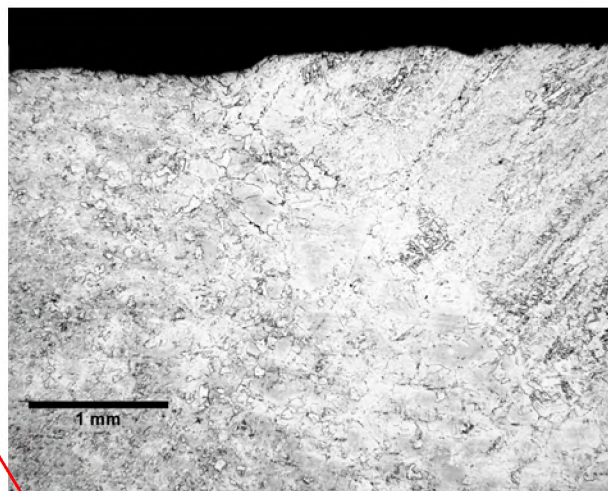


LABORATORY REPORT-LS3 TOP

**MOUNT 15 TO
ID IS ON THE TOP**



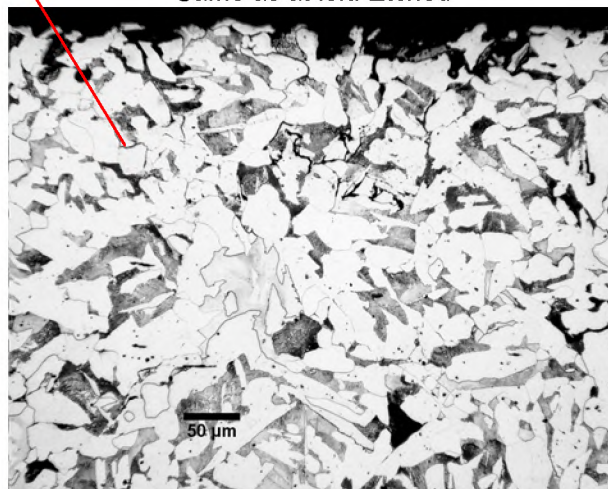
Area at the weld toe at ID



Same as at left. Etched



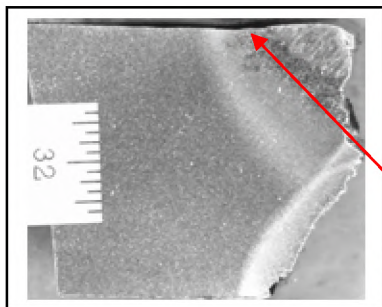
Weld metal near ID. Etched



Area of the base metal 1.5 fields down from the toe of the weld. Etched.

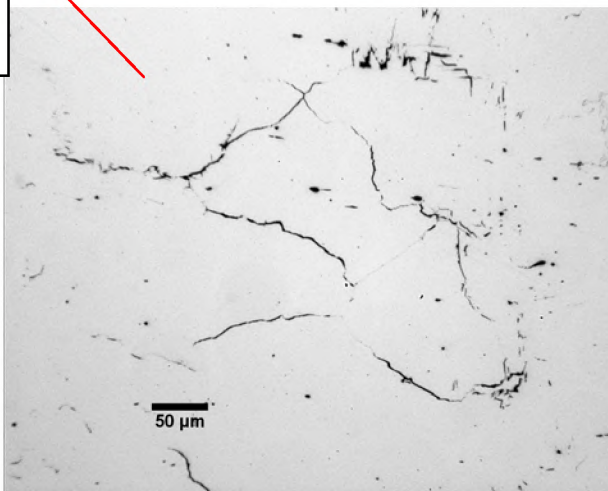
Figure 29

| | | |
|--|---|-------------------------------|
| BETA LAB No.M10198- LS3 TOP | TESORO REFINING AND MARKETING COMPANY ANACORTES REFINERY 10200 W. MARCH POINT ROAD T91WA4428 ANACORTES, WA 98221 | CUSTOMER P.O. No.: 4501667904 |
| PART: 6600-E HEAT EXCHANGER LS 3 TOP PART 15 | | DATE: SEPTEMBER 20, 2010 |
| PAGE 35 OF 53 | | |

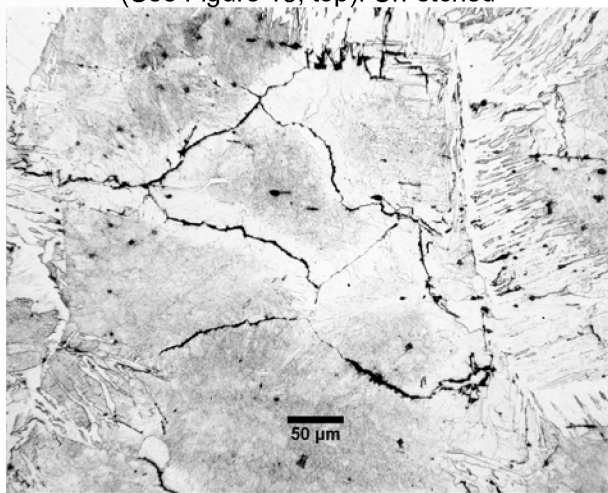


LABORATORY REPORT-LS3 TOP

**MOUNT 15 T0
ID IS ON THE TOP**



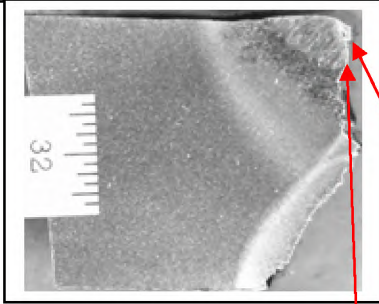
Area at weld toe near ID at higher magnification
(See Figure 18, top). Un-etched



Same as above. Etched

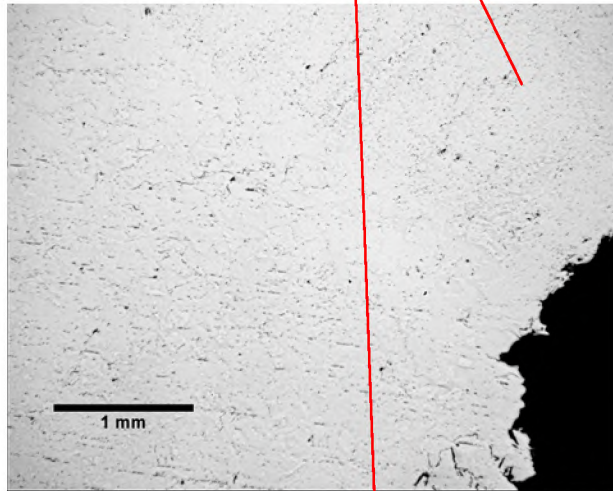
Figure 30

| | | |
|--|---|-------------------------------|
| BETA LAB No.M10198- LS3 TOP | TESORO REFINING AND MARKETING COMPANY ANACORTES REFINERY 10200 W. MARCH POINT ROAD T91WA4428 ANACORTES, WA 98221 | CUSTOMER P.O. No.: 4501667904 |
| PART: 6600-E HEAT EXCHANGER LS 3 TOP PART 15 | | DATE: SEPTEMBER 20, 2010 |
| PAGE 36 OF 53 | | |

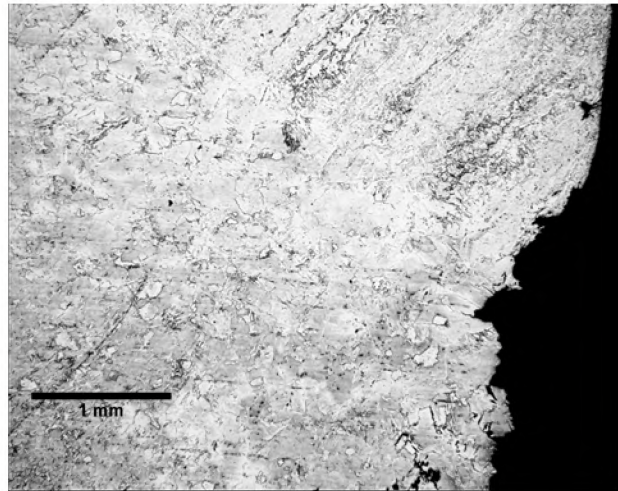


LABORATORY REPORT-LS3 TOP

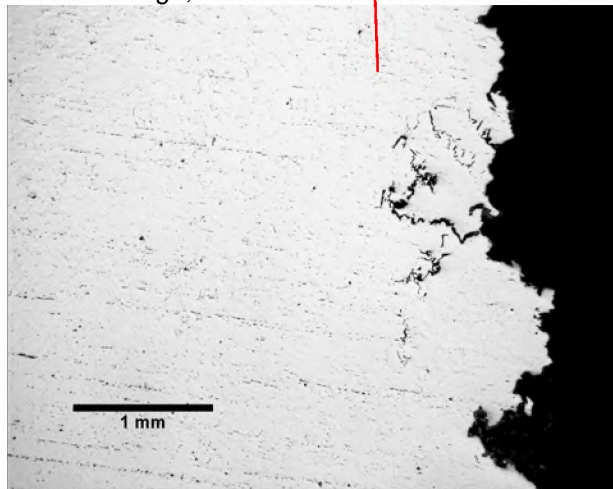
**MOUNT 15 TO
ID IS ON THE TOP**



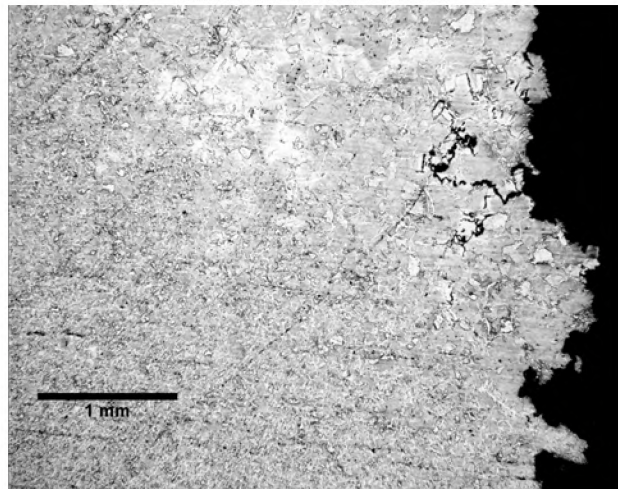
Fracture edge, one field down from ID. Un-etched



Same as at left. Etched



Fracture edge, two fields down from ID. Un-etched



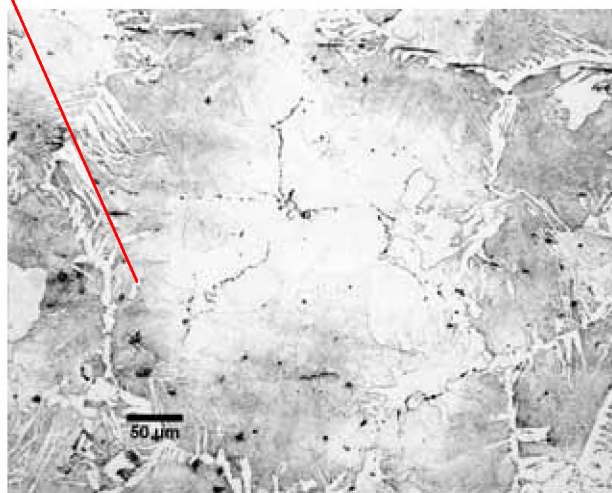
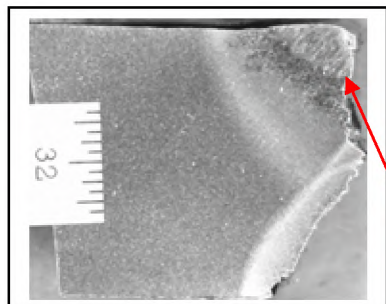
Same as at left. Etched

Figure 31

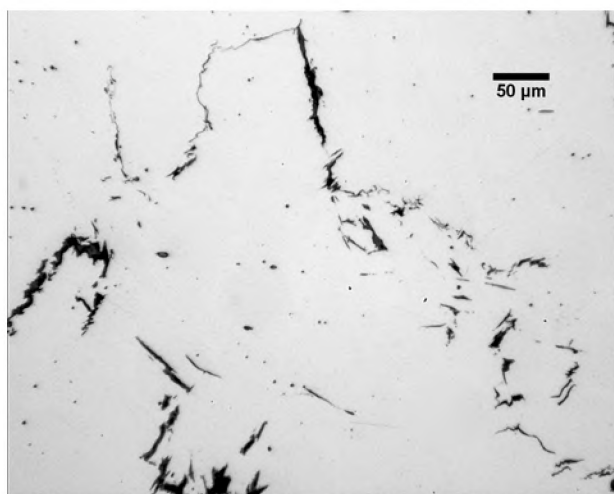
| | | |
|--|---|-------------------------------|
| BETA LAB No.M10198- LS3 TOP | TESORO REFINING AND MARKETING COMPANY ANACORTES REFINERY 10200 W. MARCH POINT ROAD T91WA4428 ANACORTES, WA 98221 | CUSTOMER P.O. No.: 4501667904 |
| PART: 6600-E HEAT EXCHANGER LS 3 TOP PART 15 | | DATE: SEPTEMBER 20, 2010 |
| PAGE 37 OF 53 | | |

LABORATORY REPORT-LS3 TOP

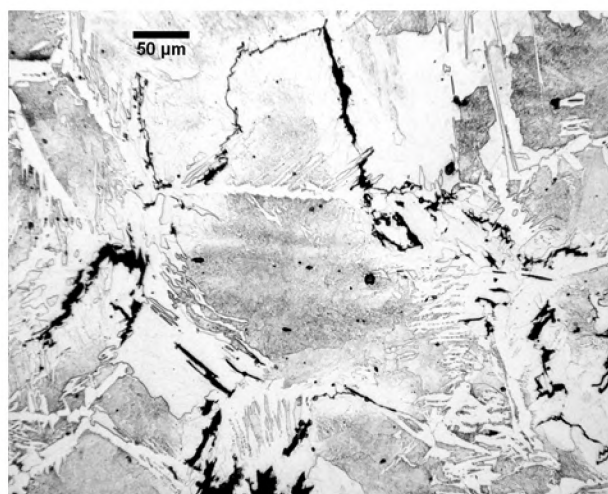
MOUNT 15 T0
ID IS ON THE TOP



Area down one field (see picture in Figure 31 above) from the ID and near the fracture edge.
 Etched



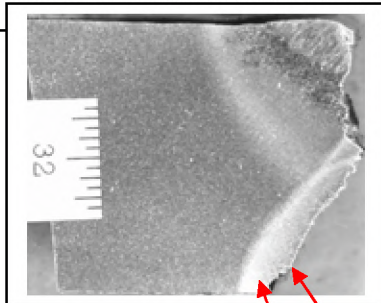
Area down two fields (see picture in Figure 31 above) from the ID and near the fracture edge.
 Un-etched



Area down two fields (see picture in Figure 31 above) from the ID and near the fracture edge.
 Etched

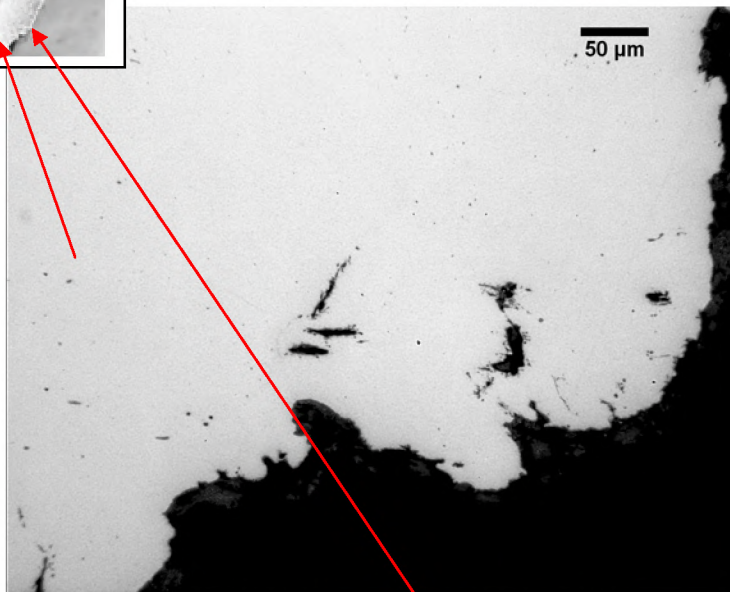
Figure 32

| | | |
|--|---|-------------------------------|
| BETA LAB No.M10198- LS3 TOP | TESORO REFINING AND MARKETING COMPANY ANACORTES REFINERY 10200 W. MARCH POINT ROAD T91WA4428 ANACORTES, WA 98221 | CUSTOMER P.O. No.: 4501667904 |
| PART: 6600-E HEAT EXCHANGER LS 3 TOP PART 15 | | DATE: SEPTEMBER 20, 2010 |
| PAGE 38 OF 53 | | |

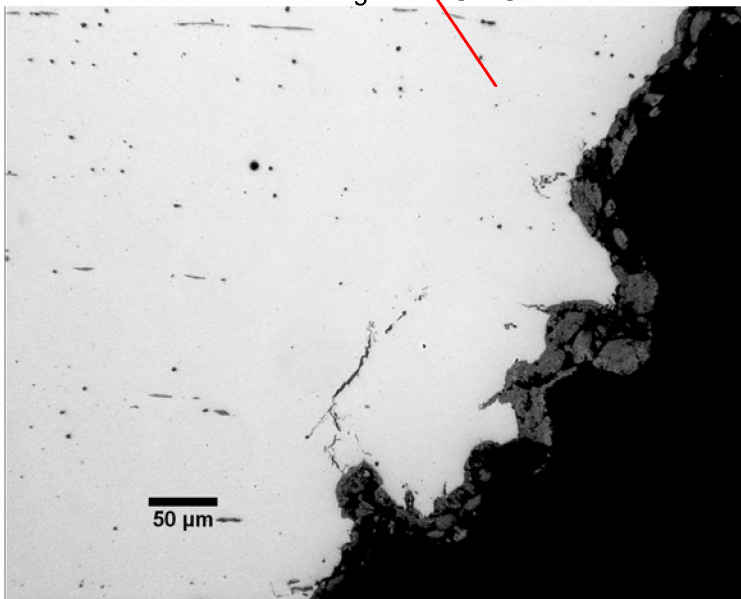


LABORATORY REPORT-LS3 TOP

MOUNT 15 T0
ID IS ON THE TOP



Area at fracture edge near OD-Un-etched



Area at the fracture edge 1.5 fields up from the OD--Un-etched

Figure 33

| | | |
|--|---|-------------------------------|
| BETA LAB No.M10198- LS3 TOP | TESORO REFINING AND MARKETING COMPANY ANACORTES REFINERY 10200 W. MARCH POINT ROAD T91WA4428 ANACORTES, WA 98221 | CUSTOMER P.O. No.: 4501667904 |
| PART: 6600-E HEAT EXCHANGER LS 3 TOP PART 15 | | DATE: SEPTEMBER 20, 2010 |
| PAGE 39 OF 53 | | |

LABORATORY REPORT-LS3 TOP
ATTACHMENT 1 TEST PROTOCOL AND ADDENDUM

Tesoro Exchanger E Failure Examination Protocol

Part 1. Field Visual and Nondestructive Examination

Part 1 of this protocol identifies visual and non-destructive testing that is approved to be conducted on the shell of exchanger 6600-E by a contractor acceptable to the parties to this agreement. Prior to performing any visual inspection or non-destructive testing, 3 business days notice must be provided to all parties to the agreement to allow the opportunity to observe. Parties to this agreement may elect not to perform aspects of the visual inspection or non-destructive testing described in this protocol. Should parties identify the need to conduct additional inspection or non-destructive testing not described in Part 1 of this protocol, 2 days notice must be provided to all parties to this agreement in order to register any objections.

Detailed visual inspection and testing will not be permitted until the equipment is placed in the secure evidence storage location.

All field visual and nondestructive tests shall be appropriately documented indicating examinations performed, scope of examinations, test equipment used in examinations, results of testing and the qualifications of the examiner as appropriate. All reports will be signed and dated by the examiner(s). Data reports shall be distributed within 48 hours of examinations by the third party conducting these examinations to all parties simultaneously. No party shall have the opportunity to review any data results in advance of the other parties. Any part requesting clarification or correction of anything in the report shall submit their request to all parties.

Data generated as a result of the execution of this protocol will be shared with all parties to the agreement simultaneously. Visual inspection reports, analysis or conclusion will not be shared.

Each party conducting field visual and nondestructive examination shall be assigned a unique set of alpha-numeric sets of markings. The format of the markings shall be AXXX, BXXX, CXXX, etc. The markings shall be applied to the external surfaces of the shell only and shall be permanent in nature (etch, stamp, etc.). Any markings shall be applied at least two (2) inches from any fracture surface. The markings shall be used for purposes described in Part 1 of this protocol and may also be used to identify locations of specific areas of interest determined by any examination conducted in Part 1. Each party using the markings shall supply a drawing identifying unique markings used and locations of these markings on the shell for information to all parties.

Field Visual Examination

1. Photographically document the heat exchanger in the "as-found" condition before initiating the metallurgical analysis. Documentation should include the following:
 - Any reference points needed
 - Fracture area and surface
 - Seams