



TO Kirk Ezelle

DATE September 6, 1983

FROM Roy E. Sanders

SUBJECT No. 4 Per/Tri Reactor
Sac No. 59-10
SUMMARY

Reactor No. 59-10 upper dome and tubes are fast approaching the end of their useful life. The upper dome metal is thin and there are curious bulges between the expansion joint rings and in the shell. However, if the rupture discs are derated from 75 psi to 50 psi and if Operations plans to run this unit no more than 5 months, Industrial Engineering will not object.

DISCUSSION

Reactor No. 59-10 was inspected by Dave Benton and Clarence Kickel on July 22, 1983 with a report recommending that the unit not be operated again due to bulging and wall thinning to 0.18 - 0.19 inches in the upper dome. See the attached report on the subject.

Operations did not object to the recommendation until a production need arose. With the new production requirements, Industrial Engineering reinspected the reactor dome.

Dave Benton and Warren Woolfolk reinspected the unit today. If our limited corrosion-erosion data is correct, the metal wear has approached 0.005 inches/month recently. The maximum allowable working pressure was calculated to be 50 psi with a 0.0313 inch corrosion allowable so this is good for a 5 month run. We cannot say with any certainty that there may be some dome leaks as a result of corrosion/erosion during this run.

Additional recommended work includes:

1. Recognize that three tubes are below minimum wall thickness of 0.250 inches and that eleven tubes are borderline.
2. Tube sheet cladding needs weld repairs.
3. Other Industrial Engineering repairs marked on the unit are completed.

RES/cj

Attachments

cc: (w/o attachments)
John Hart
Arville Hoffpauir
Jo Morgan

I. E. Files (ACTIVE)
I. E. Circulate

SL 047959

P/T Reactor # 59-10

Sept. 6, 1983

$$P = \frac{SEt}{R + 0.6(t)}$$

$$t = .19''$$

$$E = 1.0$$

$$R = 57$$

$$S = 18700$$

$$Ca = 0.03125$$

$$t = 0.19 - 0.03125 =$$

$$t = 0.15875$$

$$P = \frac{18700 (1) .1587}{57 + 0.6(.1587)}$$

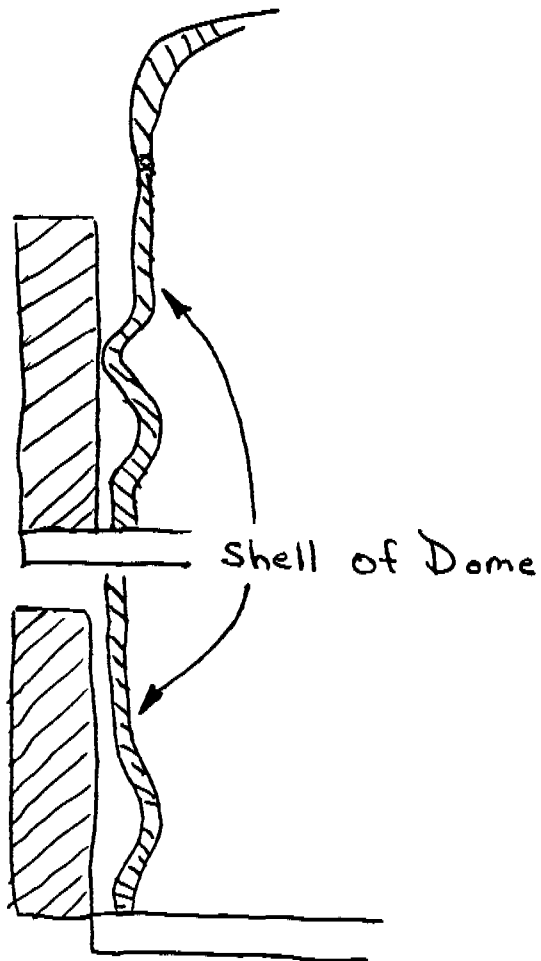
$$P = \frac{2967.69}{57.0522}$$

$$P = 51.9 \text{ PSI}$$

This is giving the reactor a $\frac{1}{32}''$ corrosion allowance

Sept 6, 1983

Today the reactor was reinspected
and the buldge was looked over
again.



SL 047961



VESSEL INSPECTION REPORT
INDUSTRIAL ENGINEERING DEPARTMENT
LAKE CHARLES, LA.

SAC. NO.

59-10

AREA

Per Tri

VESSEL NAME:

P/T Reactor

CONDITION CODES OF VESSEL OR TANK VENT

- X = Not Applicable
1 = Immediate attention recommended
2 = Attention within next 6 months
s = Satisfactory

LIMITATION CODES

- A = Inspection limited due to insulation.
B = Inspection limited to spot removal of insulation
C = Inspection limited due to access.
D = Internal inspection from outside manway.

LIMITATIONS

INSPECTION
TYPES

EXTERNAL

INTERNAL

UT
THICKNESS

HYDRO
TEST

SHELL

TUBES

JACKET

HEADS

NOZZLES

COATING

LINING

INSULATION

APPURTENANCES

FOUNDATIONS

SUPPORTS

ANCHOR BOLTS

SKIRTS

FIRE PROOFING

GROUNDING

RELIEF DEVICES

EQUIP. I.D.

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☒☒☒☒☒☒☒☒☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

TANK VENT INSPECTION

Location No. _____

Valve No. _____

- ☐ Hinge
☐ Diaphragm
☐ Bonnet
☐ Retaining Ring/Spring

- ☐ Lead Weight if applicat
☐ Liquid Seal
☐ Seat
☐ ID Tag

☐ Satisfactory

☐ Unsatisfactory

It is ~~my~~ recommendation to Not use the Reactor because of the bulging in the shell. If it must be reused the vessel will have to be derated to 41 psi due to the shell errasion.

INDUSTRIAL ENGINEERING DOES NOT HAVE ENOUGH INFO AT THIS TIME TO SET A STANDARD CORROSION-EROSION ALLOWANCE FOR PER/TRI REACTOR DOME. IF THIS CONSERVATIVE 41 PS MAXIMUM IS TROUBLESOME OR IF OPERATIONS PLANS A SHORT PRODUCTION RUN, PLEASE CALL ROY SANDERS

INSPECTOR

D.B.

SL 047962

DATE 7-22-6

P/T Reactor # 59-10

- (1) Tubes # 2, 7, & 8 are very thin.
- (2) North west to South west portion of shell is bulging inward. If we reuse this shell this condition could get worse and cause the shell to fail.
- (3) North to East portion of shell has an average thickness of .19"
- (4) Dome was too dirty to inspect.
- (5) Tube sheet cladding needed repairs
- (6) Both R/D nozzles need repair and so do two other nozzles
- (7) Reactor would need derating to 41 PSI if used using existing shell.

Dad Bate

P/T Reactor # 59-10

$$P = \frac{Set}{R + 0.6t}$$

$$t = .19''$$

$$E = 1.0$$

$$R = 57$$

$$S = 18700$$

$$CA = .0625''$$

$$t = .19 - .0625 = .1275''$$

$$P = \frac{18700 (1) \cdot .1275''}{57 + (.6) \cdot .1275}$$

$$P = \frac{2384.25}{57.0765}$$

$$P = \boxed{41 \text{ PSI}} \text{ With corrosion allowance}$$

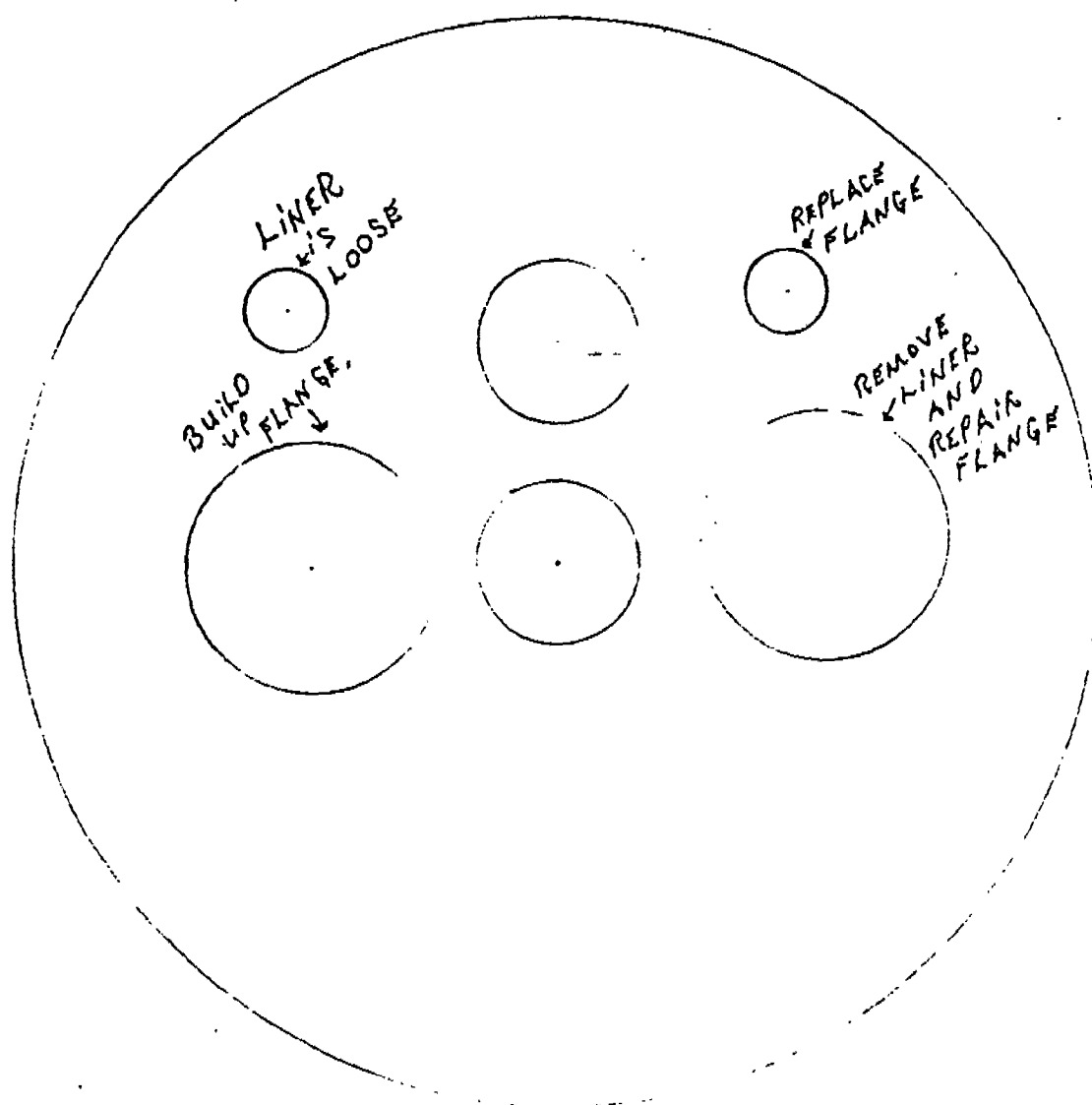
$$P = \frac{18700 (1) \cdot .19}{57 + (.6) \cdot .19}$$

$$P = \frac{3553}{57.114}$$

$$P = 62 \text{ PSI} \text{ With } ^{100} \text{ corrosion allowance}$$

DGB

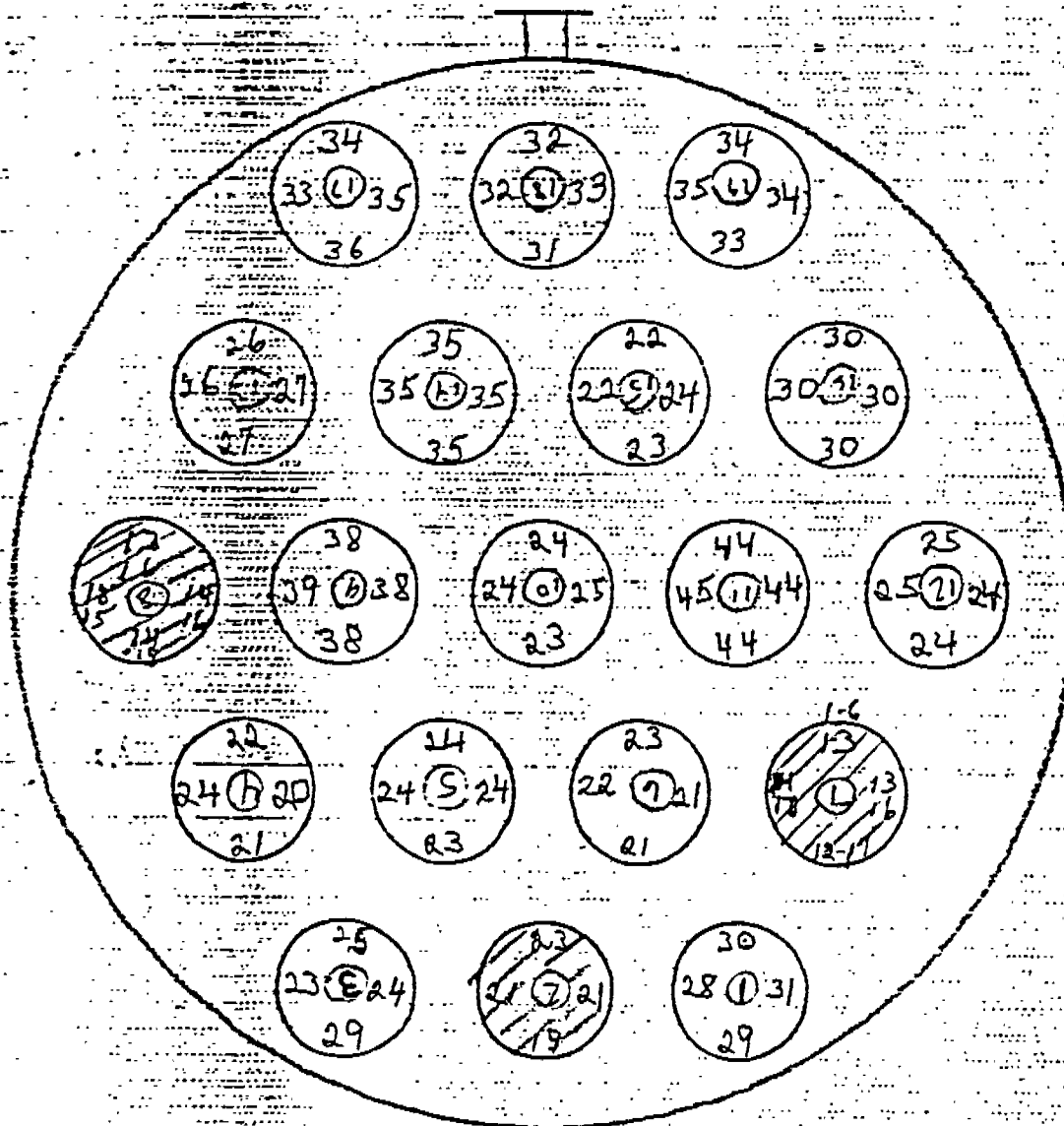
N
↑



REMOVE LINER AND REPLACE NEW
ABOVE TUBE SHEET.

SL 047965

SAC 59-10 : C KICKEL / D. BENTON 7-21-83



Per-Tri Reactor

≡ App. 3' from top



= App. 2' from top

SL 047966

Rx # 59-10

7-21-83

C KICKEL

D. BENTON

DATE 7-21-85

SAC # 59-10

SHELL
WELD

DOMED

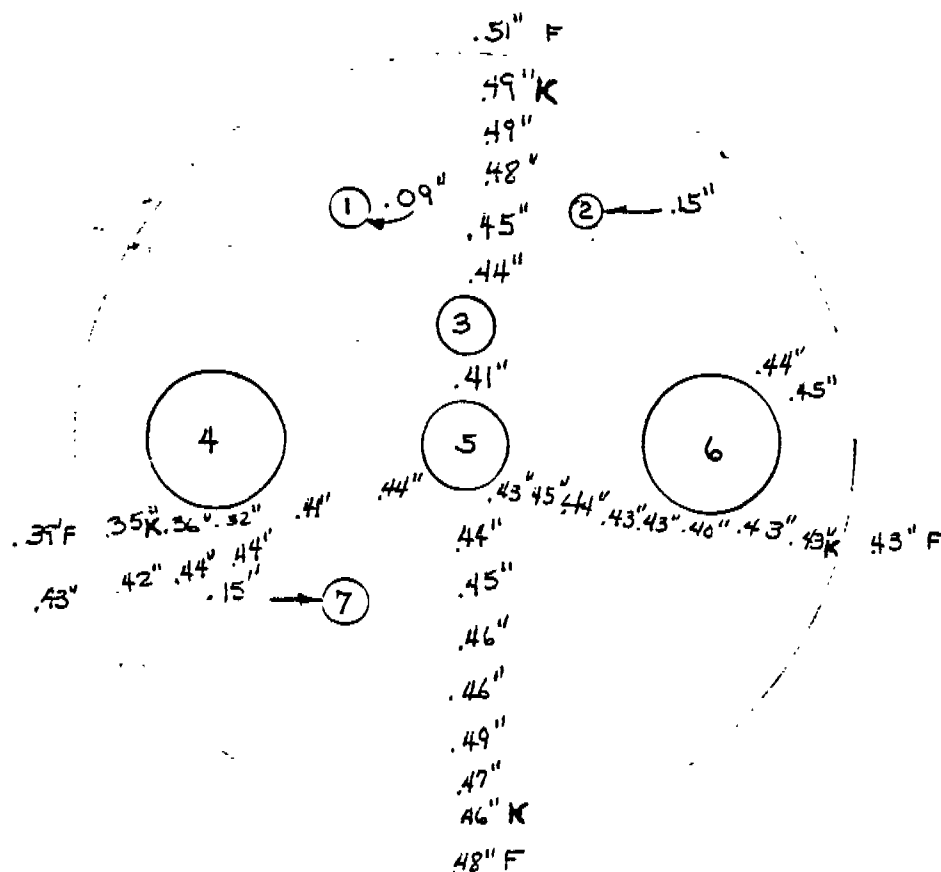
SHELL
WELD

S	W	N	E	S
26	32	24 26 27	24 21	32 27
26		24 24  24	26 21	28
22	32	22 22 22 	22 21	26
21	33	20 20 20 18	21 21	22
20	30	21 21 18	20 20	21
	33	21 23	19 20	21 21
20	31	21 27 25 20	18 21 18	29 22
20		31 31 30	18 17 19 18 19	29 22
30 31 31 29				

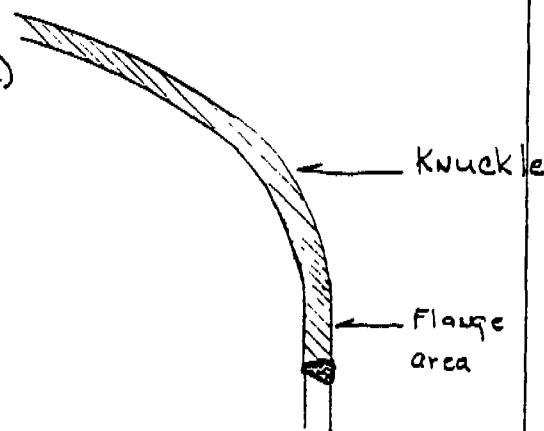
TUBE SHEET

SL 047967

42-102 100 SHEETS
made in U.S.A.



- | | | |
|----|--------|---------------------------------------|
| #1 | Nozzle | needs replaced |
| #2 | Nozzle | needs repaired inside (crack in weld) |
| #3 | Nozzle | OK |
| #4 | Nozzle | OK |
| #5 | Nozzle | OK |
| #6 | Nozzle | OK |
| #7 | Nozzle | OK |



Three areas need repair between the flange area and the knuckle. The first area is on the North portion of the vessel. The other two are located on the east portion of the vessel. All were marked.



LAR CHARLES PLANT ENGINEERING DIVISION

Industrial Engineering Department

VESSEL AND/OR PIPING INSPECTION REPORT

METAL THICKNESS MEASUREMENTS
(ULTRASONIC METHOD)

No. _____

REACTOR NO. 59-10

TUBE NO. 1

DATE 7-29-83

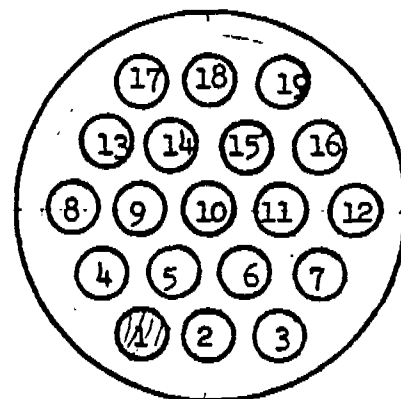
INSPECTORS OK / DB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.31	.31	.31	.32
4 ft.	.31	.22	.35	.33
5 ft.	.30	.32	.34	.32
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.
**2" From Bottom of Tube.

SL 047969



LARL CHARLES PLANT
ENGINEERING DIVISION

Industrial Engineering Department

VESSEL AND/OR TANK INSPECTION

METAL THICKNESS MEASUREMENTS
(ULTRASONIC METHOD)

No. _____

REACTOR NO. 59-10

TUBE NO. 2

DATE 7-29-82

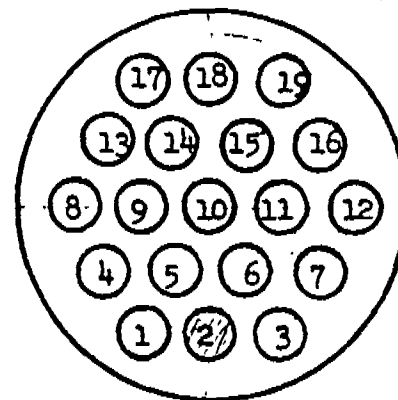
INSPECTORS CK/DIS

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.30	.28	.29	.31
4 ft.	.31	.29	.29	.30
5 ft.	.30	.28	.28	.30
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.
**2" From Bottom of Tube.

SL 047970



LARK CHARLES LEAH

ENGINEERING DIVISION

Industrial Engineering Department

VESSEL AND/OR FILING INFORMATION

METAL THICKNESS MEASUREMENTS
(ULTRASONIC METHOD)

No. _____

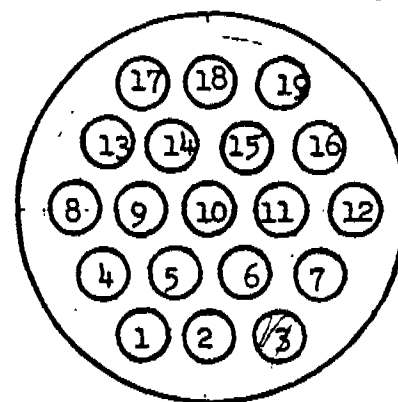
REACTOR NO. 59-10TUBE NO. 3DATE 7-25-83INSPECTORS CIA ZNB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.35	.36	.34	.59
4 ft.	.36	.37	.36	.37
5 ft.	.38	.36	.35	.36
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH

Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

SL 047971

REACTOR NO. 59-10

TUBE NO. 4

DATE 7-29-83

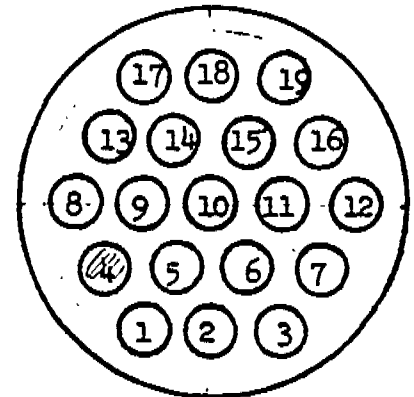
INSPECTORS CK / DB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.31	.28	.29	.31
4 ft.	.32	.27	.30	.33
5 ft.	.29	.26	.30	.32
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.
**2" From Bottom of Tube.

SL 047972

REACTOR NO. 59-10

TUBE NO. 5

DATE 7-29-83

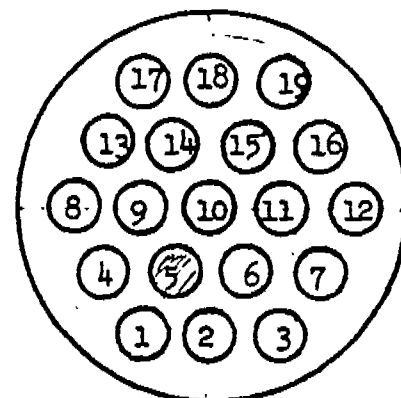
INSPECTORS C. K. ZDR

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.29	.29	.32	.32
4 ft.	.29	.29	.32	.33
5 ft.	.28	.28	.31	.34
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

SL 047973

REACTOR NO. 59-10

TUBE NO. 6

DATE 7-24-73

INSPECTORS

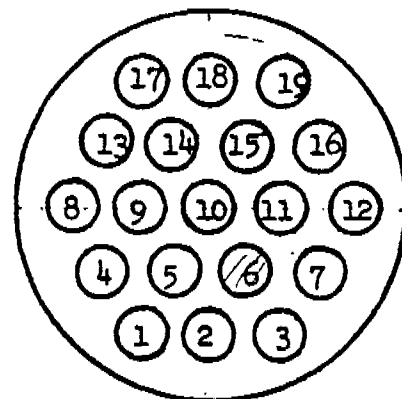
OK / DR

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.31	.31	.30	.31
4 ft.	.32	.30	.30	.36
5 ft.	.30	.26	.28	.34
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
 Tubes - Plan View at Top
 of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

SL 047974

REACTOR NO. 59-10

TUBE NO. 7

DATE 7-29-83

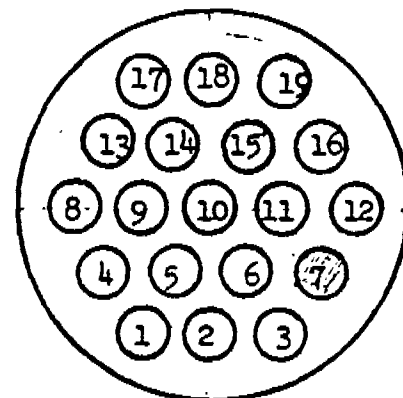
INSPECTORS CK / DR

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.30	.25	.31	.31
4 ft.	.29	.20	.24	.30
5 ft.	.26	.18 1/1	.20	.29
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
 Tubes - Plan View at Top
 of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.



L. C. INDUSTRIES PLANT ENGINEERING DIVISION

Industrial Engineering Department

VESSEL AND/OR PIPING INSPECTION REPORT

METAL THICKNESS MEASUREMENTS
(ULTRASONIC METHOD)

No. _____

REACTOR NO. 59-10

TUBE NO. 8

DATE 2-29-82

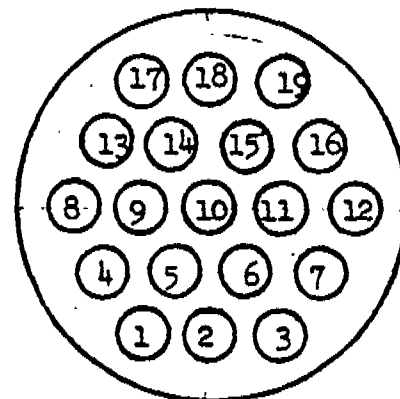
INSPECTORS PK / DR

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.28	.24	.32	.33
4 ft.	.29	.20	.31	.31
5 ft.	.22	.17	.25	.31
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

SL 047976



LANE CHARLES FLANNERY ENGINEERING DIVISION

Industrial Engineering Department

VESSEL AND/OR PIPING INSPECTION REPORT

METAL THICKNESS MEASUREMENTS
(ULTRASONIC METHOD)

No. _____

REACTOR NO. 59-10

TUBE NO. 9

DATE 7-28-83

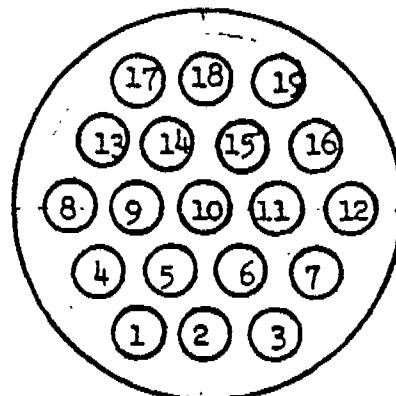
INSPECTORS UK TDR

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.41	.42	.42	.43
4 ft.	.42	.41	.42	.43
5 ft.	.40	.41	.41	.42
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.
**2" From Bottom of Tube.

SL 047977

REACTOR NO. 59-10

TUBE NO. 10

DATE 7-29-52

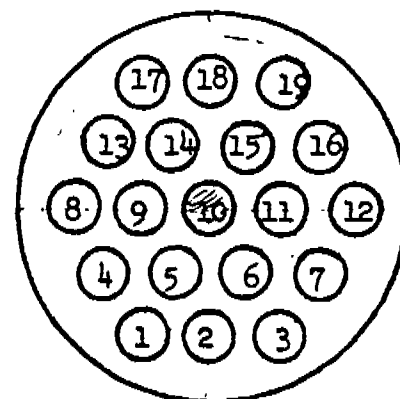
INSPECTORS AK / DB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.33	.31	.31	.33 ^r
4 ft.	.33	.31	.33	.35
5 ft.	.31	.31	.31	.36
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

SL 047978



LARRE CHARLES PLANT ENGINEERING DIVISION

Industrial Engine ring D partment

VESSEL AND/OR PIPING INSPECTION REPORT

METAL THICKNESS MEASUREMENTS
(ULTRASONIC METHOD)

No. _____

REACTOR NO. 59-10

TUBE NO. 11

DATE 7-29-83

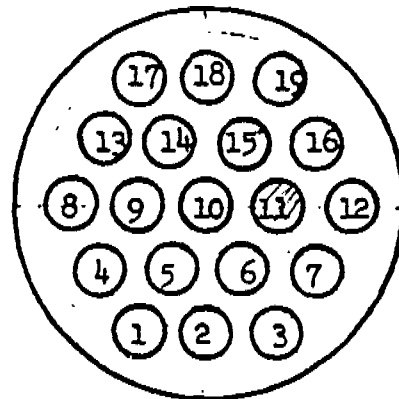
INSPECTORS CV / DB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.44	.45	.45	.45
4 ft.	.47	.45	.44	.46
5 ft.	.46	.45	.46	.47
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.
**2" From Bottom of Tube.

SL 047979

REACTOR NO. 59-10

TUBE NO. 12

DATE 7-28-83

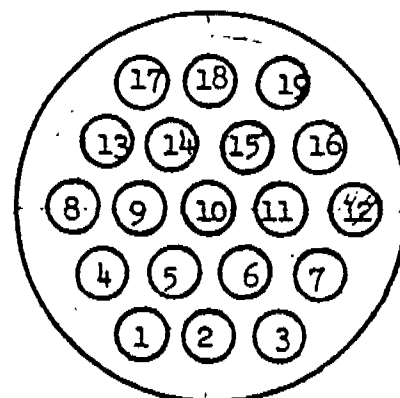
INSPECTORS U/K / DB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.35	.32	.31	.34
4 ft.	.37	.33	.32	.35
5 ft.	.35	.30	.29	.33
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

SL 047980



LARSEN CHARLES PLANT ENGINEERING DIVISION

Industrial Engine ring Department

VESSEL AND/OR PIPING INSPECTION

METAL THICKNESS MEASUREMENTS
(ULTRASONIC METHOD)

No. _____

REACTOR NO. 59-10

TUBE NO. 13

DATE 7-29-83

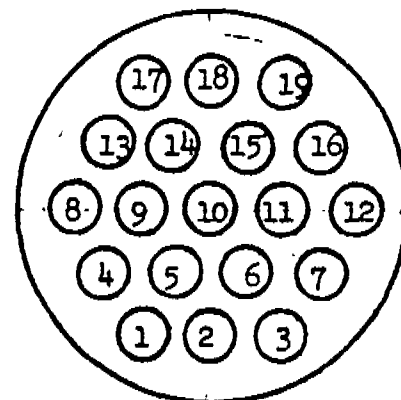
INSPECTORS HK/DR

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.35	.35	.36	.45
4 ft.	.33	.34	.38	.44
5 ft.	.36	.34	.41	.45
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.
**2" From Bottom of Tube.

SL 047981

REACTOR NO. 59-10

TUBE NO. 14

DATE 7-20-73

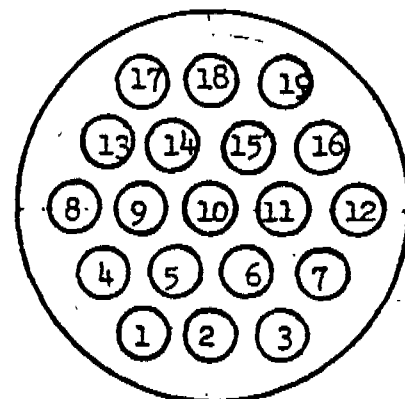
INSPECTORS PK / DB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	42	42	51	44
4 ft.	.41	42	50	.45
5 ft.	.47	.40	.44	.47
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

REACTOR NO. 55-10

TUBE NO. 15

DATE 7-29-83

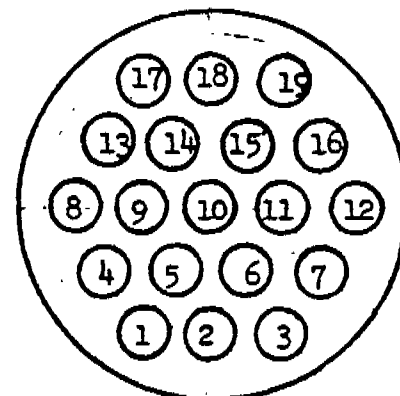
INSPECTORS OK/DR

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.32	.33	.33	.38
4 ft.	.32	.32	.34	.34
5 ft.	.34	.32	.33	.31
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.
**2" From Bottom of Tube.

SL 047983



LANE CHARLES FLANNERY ENGINEERING DIVISION

Industrial Engineering Department

VESSEL AND/OR PIPING INSPECTION REPORT

METAL THICKNESS MEASUREMENTS
(ULTRASONIC METHOD)

No. _____

REACTOR NO. 59-10

TUBE NO. 16

DATE 7-29-85

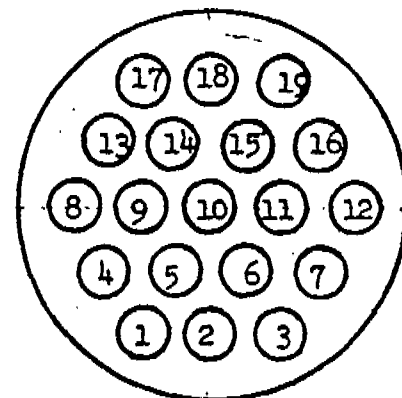
INSPECTORS U K LDB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.44	.39	.38	.42
4 ft.	.410	.38	.44	.40
5 ft.	.39	.42	.44	.480
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

SL 047984

REACTOR NO. 59-10

TUBE NO. 17

DATE 7-29-83

INSPECTORS

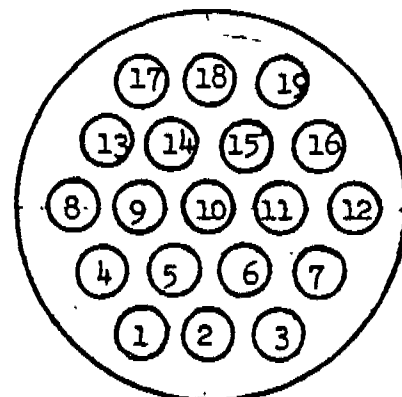
CK/DR

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	480	410	430	43
4 ft.	520	440	480	480
5 ft.	490	480	420	430
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

SL 047985

REACTOR NO. 59-10

TUBE NO. 18

DATE 7-29-82

INSPECTORS

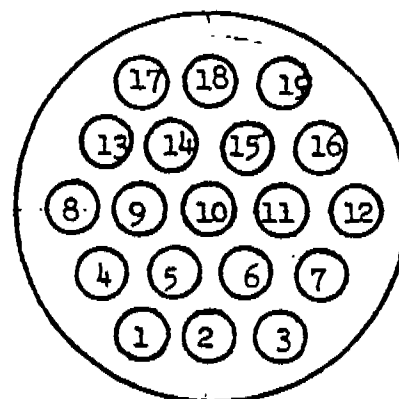
TK/DB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.	43			
3 ft.	44			45
4 ft.	49	49	44	45
5 ft.	49	44	48	43
6 ft.	45			46
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

SL 047986



LAKE CHARLES PLANT ENGINEERING DIVISION

Industrial Engineering Department

VESSEL AND/OR PIPING INSPECTION REPORT

METAL THICKNESS MEASUREMENTS
(ULTRASONIC METHOD)

No. _____

REACTOR NO. 59-10

TUBE NO. 19

DATE 7-25-83

INSPECTORS

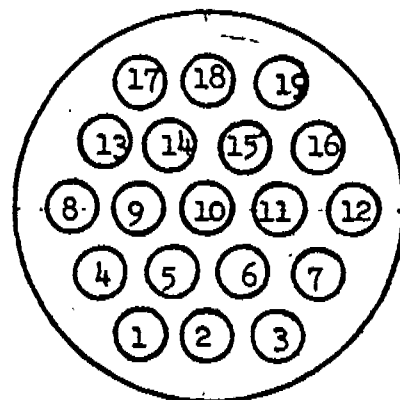
CK/DB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.45	.41	.43	
4 ft.	.43	.41	.43	.43
5 ft.	.47	.45	.43	.43
6 ft.	.45			.45
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.
**2" From Bottom of Tube.

SL 047987



VESSEL INSPECTION REPORT
INDUSTRIAL ENGINEERING DEPARTMENT
LAKE CHARLES, LA.

SAC. NO.

59-10

VESSEL NAME:

P/T Reactor

AREA

Per Tri

CONDITION CODES OF VESSEL OR TANK VENT

- = Not Applicable
- 1 = Immediate attention recommended
- 2 = Attention within next 6 months
- 3 = Satisfactory

LIMITATION CODES

- A = Inspection limited due to insulation.
- B = Inspection limited to spot removal of insulation.
- C = Inspection limited due to access.
- D = Internal inspection from outside manway.

LIMITATIONS

INSPECTION
TYPES

EXTERNAL

INTERNAL

UT
THICKNESS

HYDRO
TEST

SHELL

TUBES

JACKET

HEADS

NOZZLES

COATING

LINING

INSULATION

APPURTENANCES

FOUNDATIONS

SUPPORTS

ANCHOR BOLTS

SKIRTS

FIRE PROOFING

GROUNDING

RELIEF DEVICES

EQUIP. I.D.

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

TANK VENT INSPECTION

Location No. _____

Valve No. _____

- ☐ Hinge
- ☐ Diaphragm
- ☐ Bonnet
- ☐ Retaining Ring/Spring

- ☐ Lead Weight if applicable
- ☐ Liquid Seal
- ☐ Seat
- ☐ ID Tag

☐ Satisfactory

☐ Unsatisfactory

It is ~~my~~ recommendation to not use the
vessel because of the bulging in the
shell. If it must be reused the
vessel will have to be derated to
41 psi due to the shell erosion.

INDUSTRIAL ENGINEERING DOES NOT HAVE ENOUGH
INFO AT THIS TIME TO SET A STANDARD
CORROSION-EROSION ALLOWANCE FOR PER/TRI
REACTOR DOMES. IF THIS CONSERVATIVE 41 PSI
MAXIMUM IS TRUABLE SOME OR IF OPERATIONS
PLANS A SHORT-PRODUCTION RUN, PLEASE
CALL ROY SANDERS.

SL 047988

INSPECTOR

DB

DATE 7-22-83

P/T Reactor # 59-10

- (1) Tubes ~~2~~ 2, 7, & 8 are very thin.
- (2) Northwest to Southwest portion of shell is bulging inward. If we reuse this shell this condition could get worse and cause the shell to fail.
- (3) North to East portion of shell has an average thickness of .19"
- (4) Dome was too dirty to inspect.
- (5) Tube sheet cladding needed repairs
- (6) Both R/D nozzles need repair and so do two other nozzles
- (7) Reactor would need derating to 41 PSI if used using existing shell.

Dad Bate

P/T Reactor # 59-10

$$P = \frac{Set}{R + 0.6t}$$

$$t = .19''$$

$$E = 1.0$$

$$R = 57$$

$$S = 18700$$

$$CA = .0625''$$

$$t = .19 - .0625 = .1275''$$

$$P = \frac{18700 (1) .1275''}{57 + (.6) .1275}$$

$$P = \frac{2384.25}{57.0765}$$

$$P = 41 \text{ PSI} \text{ With corrosion allowance}$$

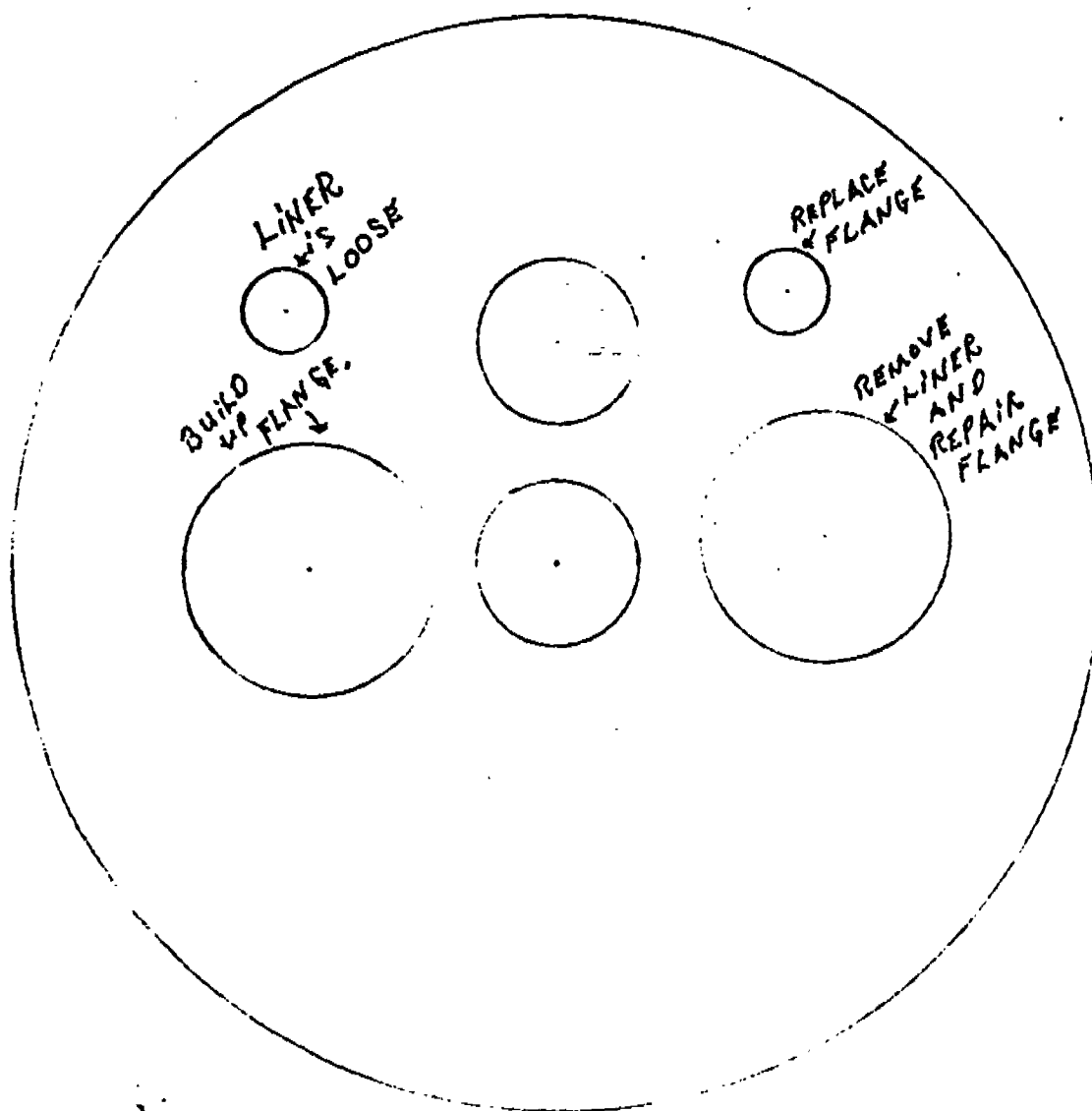
$$P = \frac{18700 (1) .19}{57 + (.6) .19}$$

$$P = \frac{3553}{57.114}$$

$$P = 62 \text{ PSI} \text{ With } ^{no} \text{ corrosion allowance}$$

DJB

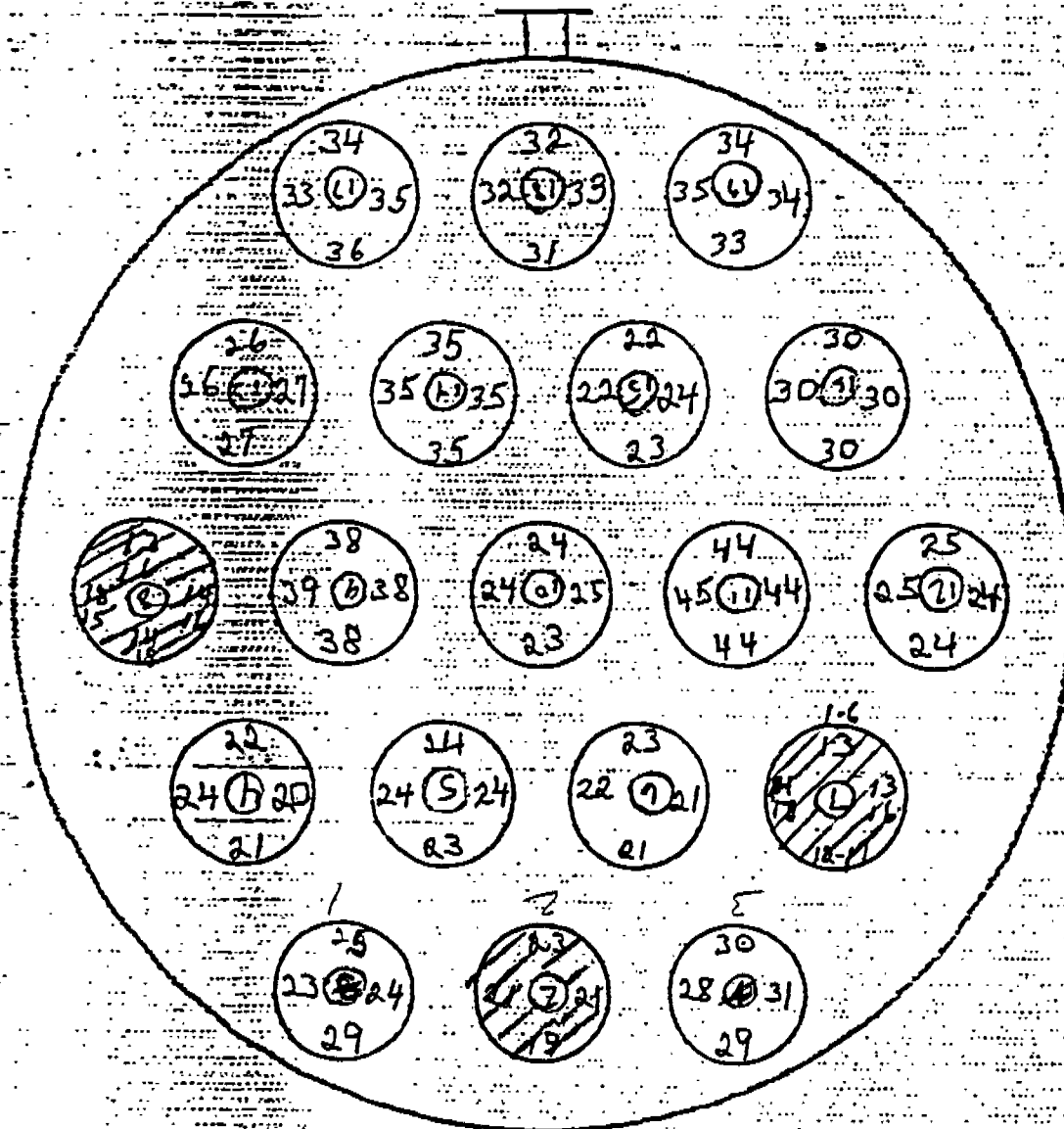
N
↑



REMOVE LINER AND REPLACE NEW
ABOVE TUBE SHEET.

SL 04799

SAC 59-10 CHKICKEL / D. BENTON 7-21-83



Per-Tri Reactor

< 200 - 2, 4, 8

< 250 - 1, 6, 5, 4, 12, 10, 15,

App. 3' from top.



= App. 2' from top

SL 047992

Rx # 59-10

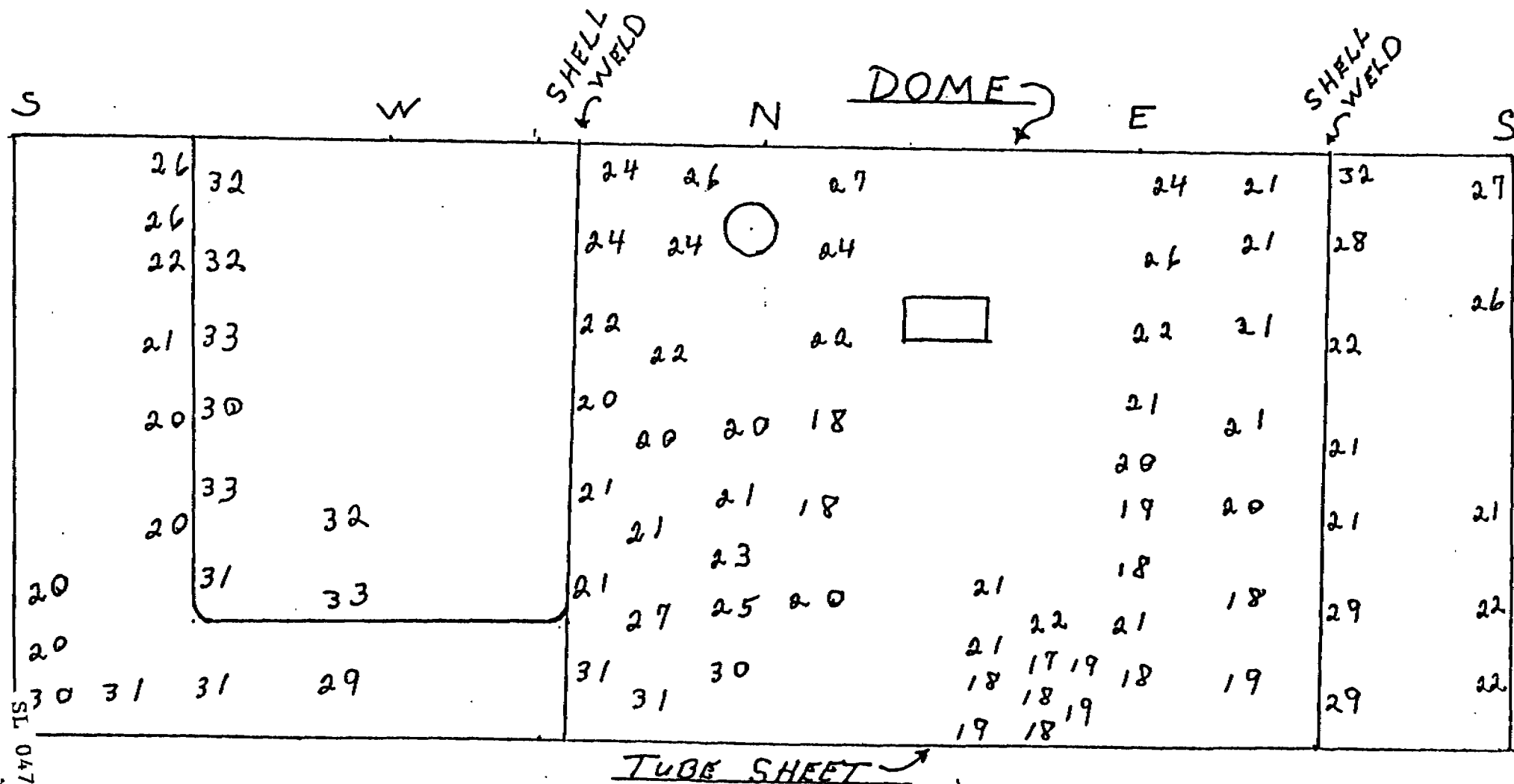
7-21-83

C KICKEL

D. BENITON

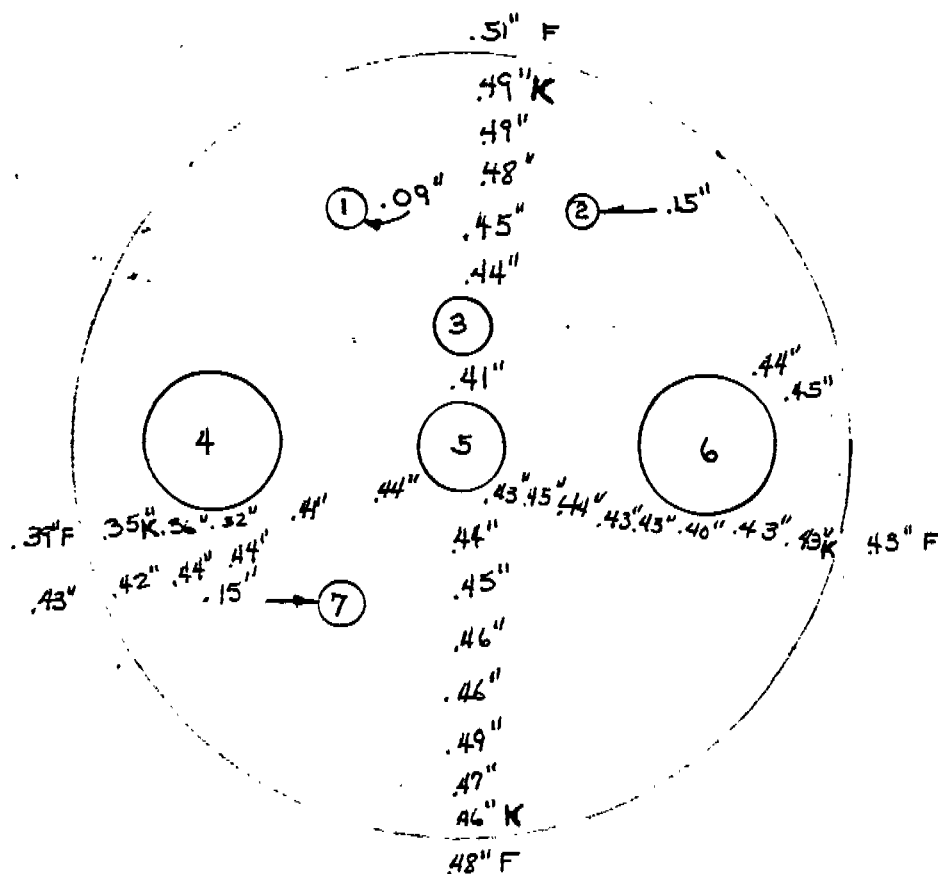
DATE 7-21-8

SAC # 59-10

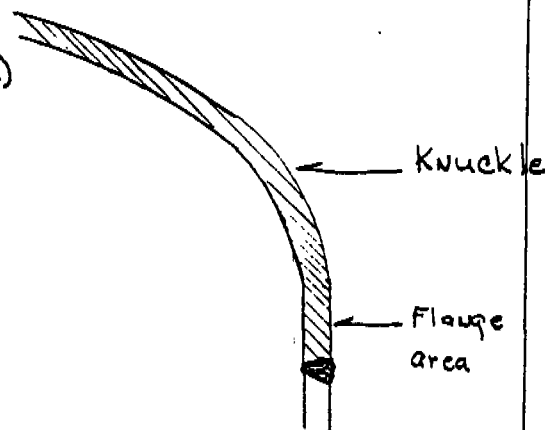


SL 047993

12



- | | | |
|----|--------|---------------------------------------|
| #1 | Nozzle | needs replaced |
| #2 | Nozzle | needs repaired inside (crack in weld) |
| #3 | Nozzle | OK |
| #4 | Nozzle | OK |
| #5 | Nozzle | OK |
| #6 | Nozzle | OK |
| #7 | Nozzle | OK |



Three areas need repair between the flange area and the knuckle. The first area is on the North portion of the vessel. The other two are located on the east portion of the vessel. All were marked.

REACTOR NO. 59-10

TUBE NO. 1

DATE 7-29-83

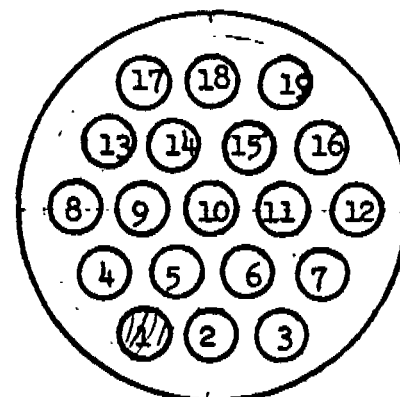
INSPECTORS CR/DB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.31	.31	.31	.32
4 ft.	.31	.22	.35	.33
5 ft.	.30	.32	.34	.32
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

REACTOR NO. 59-10

TUBE NO. 2

DATE 7-29-83

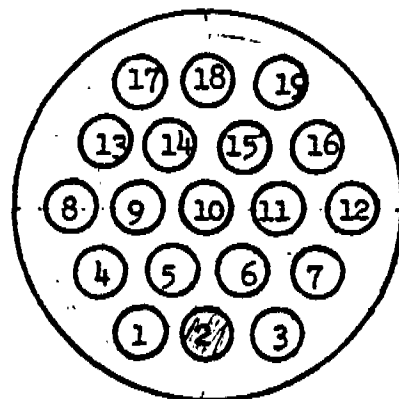
INSPECTORS CK/DJB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.30	.28	.29	.31
4 ft.	.31	.29	.29	.30
5 ft.	.30	.28	.28	.30
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

REACTOR NO. 59-10

TUBE NO. 3

DATE 7-29-83

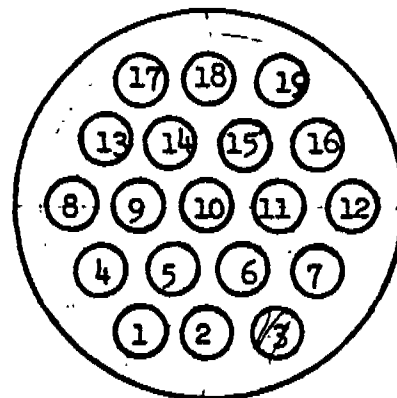
INSPECTORS CW ZDB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.35	.36	.34	.39
4 ft.	.36	.37	.36	.37
5 ft.	.38	.36	.35	.36
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor Tubes - Plan View at Top of Tubes.

Remarks _____

*2" From Top of Tube.
 **2" From Bottom of Tube.



LAKE CHARLES PLANT
ENGINEERING DIVISION

Industrial Engineering Department

VESSEL AND/OR PIPING INSPECTION RECORD

METAL THICKNESS MEASUREMENTS
(ULTRASONIC METHOD)

No. _____

REACTOR NO. 59-10

TUBE NO. 4

DATE 7-29-83

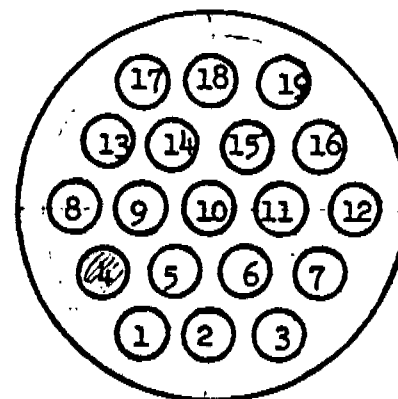
INSPECTORS CK/DB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.31	.28	.29	.31
4 ft.	.32	.27	.30	.33
5 ft.	.29	.26	.30	.32
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.
**2" From Bottom of Tube.

SL 047998



LARL CHARLES LEAVI
ENGINEERING DIVISION

Industrial Engine ring D partment

VESSEL AND/OR FILING INSPECTION MANUAL

METAL THICKNESS MEASUREMENTS
(ULTRASONIC METHOD)

No. _____

REACTOR NO. 59-10

TUBE NO. 5

DATE 7-29-83

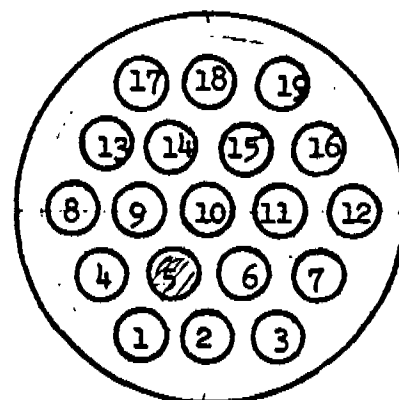
INSPECTORS C.K. ZDR

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.29	.29	.32	.32
4 ft.	.29	.29	.32	.33
5 ft.	.28	.28	.31	.34
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

SL 047999



LAKE CHARLES PLANT
ENGINEERING DIVISION

Industrial Engineering Department

VESSEL AND/OR PIPING INSPECTION REPORT

METAL THICKNESS MEASUREMENTS
(ULTRASONIC METHOD)

No. _____

REACTOR NO. 59-10

TUBE NO. 6

DATE 7-24-83

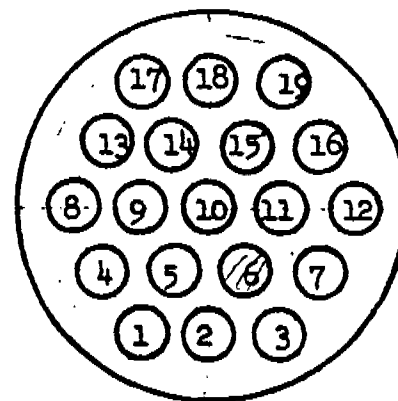
INSPECTORS OK / DB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.31	.31	.30	.31
4 ft.	.32	.30	.30	.36
5 ft.	.30	.26	.28	.34
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

SL 048000



Lake Charles Plant Engineering Division

Industrial Engineering Department

VESSEL AND/OR PIPING INSPECTION REPORT

METAL THICKNESS MEASUREMENTS
(ULTRASONIC METHOD)

No. _____

REACTOR NO. 59-10

TUBE NO. 8

DATE 7-29-83

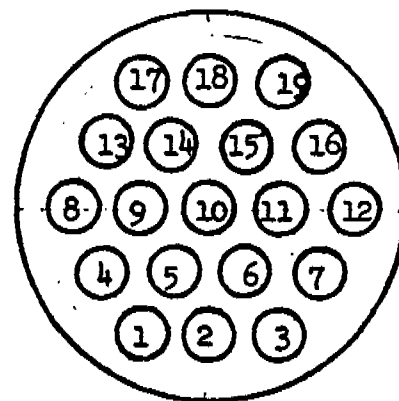
INSPECTORS CK / DR

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.28	.24	.32	.33
4 ft.	.29	.20	.31	.31
5 ft.	.22	.17	.25	.31
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

SL 048002

REACTOR NO. 59-10

TUBE NO. 9

DATE 7-28-83

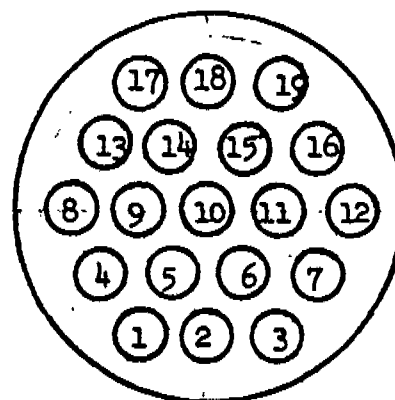
INSPECTORS CR TDR

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.41	.42	.42	.43
4 ft.	.42	.41	.42	.43
5 ft.	.410	.41	.41	.42
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

SL 048003

REACTOR NO. 59-10

TUBE NO. 10

DATE 7-29-83

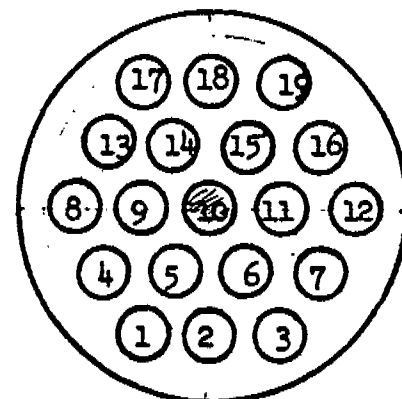
INSPECTORS AK/DB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.33	.31	.31	.33 ⁿ
4 ft.	.33	.31	.33	.35
5 ft.	.31	.31	.31	.36
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor Tubes - Plan View at Top of Tubes.

Remarks _____

*2" From Top of Tube.
**2" From Bottom of Tube.



LARRE CHARLES PLANT
ENGINEERING DIVISION

Industrial Engine ring Department

VESSEL AND/OR PIPING INSPECTION REPORT

METAL THICKNESS MEASUREMENTS
(ULTRASONIC METHOD)

No. _____

REACTOR NO. 59-10

TUBE NO. 11

DATE 7-29-83

INSPECTORS

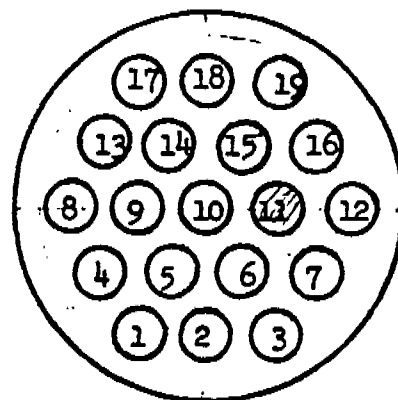
CV / DB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	1.44	.45	.45	.45
4 ft.	.47	.45	.44	.46
5 ft.	.46	.45	.46	.47
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View to Top
of Tubes.

Remarks _____

*2" From Top of Tube.
**2" From Bottom of Tube.

SL 048005



LAKE CHARLES PLANT
ENGINEERING DIVISION

Industrial Engineering Department

VESSEL AND/OR PIPING INSPECTION REPORT

METAL THICKNESS MEASUREMENTS
(ULTRASONIC METHOD)

No. _____

REACTOR NO. 59-10

TUBE NO. 12

DATE 7-29-83

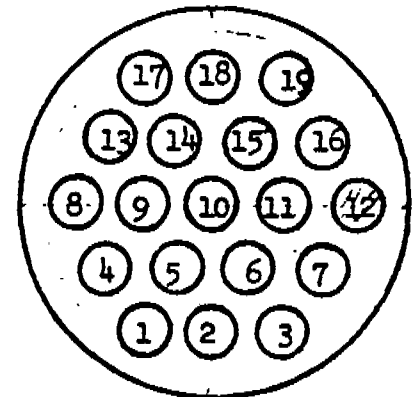
INSPECTORS U/K /DB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.35	.32	.31	.34
4 ft.	.37	.33	.32	.35
5 ft.	.35	.30	.29	.33
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

SL 048006

REACTOR NO. 59-10

TUBE NO. 13

DATE 7-29-83

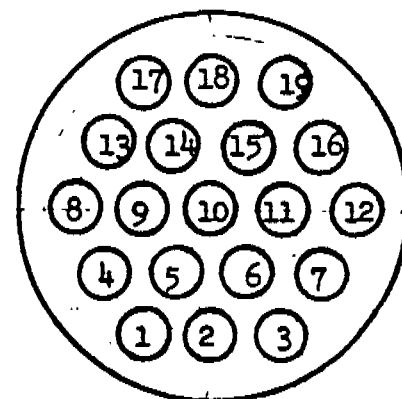
INSPECTORS MR. D.B.

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.35	.35	.36	.45
4 ft.	.33	.34	.38	.44
5 ft.	.36	.34	.41	.45
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor Tubes - Plan View at Top of Tubes.

Remarks _____

*2" From Top of Tube.
**2" From Bottom of Tube.

REACTOR NO. 59-10

TUBE NO. 14

DATE 7-20-83

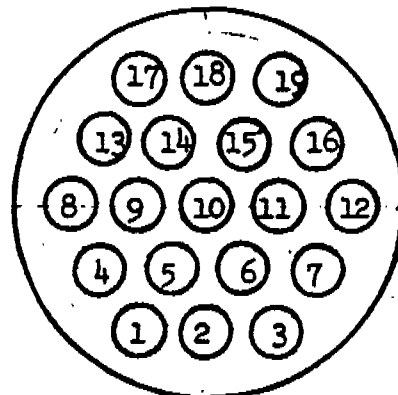
INSPECTORS CRK / DB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	42	42	51	44
4 ft.	.41	42	50	.45
5 ft.	.47	.40	.44	.47
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
 Tubes - Plan View at Top
 of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

LAKE CHARLES PLANT ENGINEERING DIVISION

Industrial Engineering Department

VESSEL AND/OR PIPING INSPECTION REPORT

METAL THICKNESS MEASUREMENTS
 (ULTRASONIC METHOD)

No. _____

REACTOR NO. 55-10

TUBE NO. 15

DATE 7-28-83

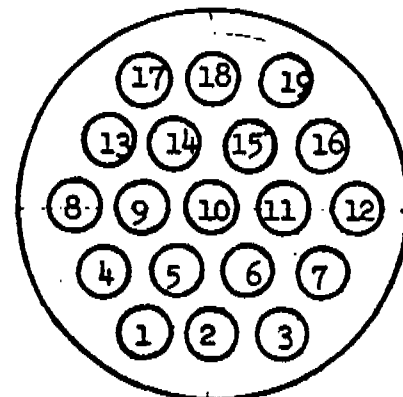
INSPECTORS OK/DR

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	32	33	33	38
4 ft.	32	32	34	34
5 ft.	34	32	33	31
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
 Tubes - Plan View at Top
 of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

SL 048009

REACTOR NO. 59-10

TUBE NO. 16

DATE 7-29-85

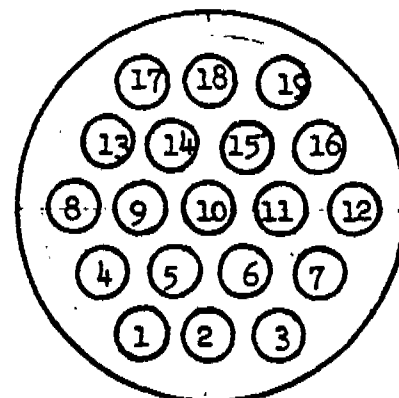
INSPECTORS CK / DB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.44	.39	38	.42
4 ft.	.410	.38	.44	.40
5 ft.	.39	.42	.44	.480
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
 Tubes - Plan View at Top
 of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

REACTOR NO. 59-10

TUBE NO. 17

DATE 7-29-83

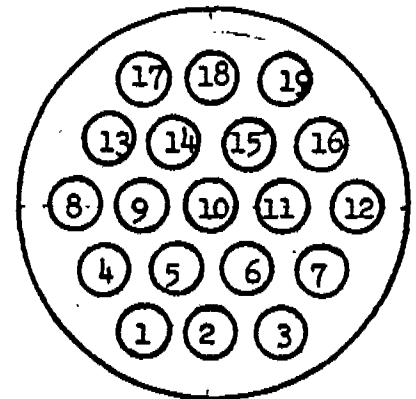
INSPECTORS CK DB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	480	410	430	43
4 ft.	520	440	480	480
5 ft.	490	480	420	430
6 ft.				
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

SL 048011

REACTOR NO. 59-10

TUBE NO. 18

DATE 7-29-83

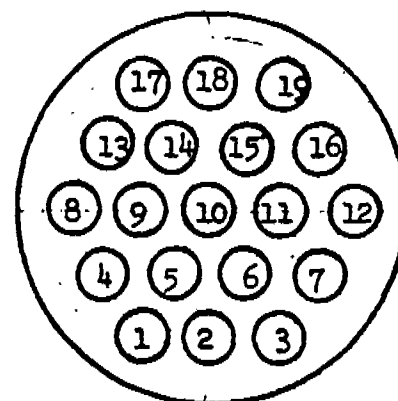
INSPECTORS CK/DB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.	43			
3 ft.	44			45
4 ft.	49	49	44	45
5 ft.	49	44	48	43
6 ft.	45			46
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor
Tubes - Plan View at Top
of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.

REACTOR NO. 59-10

TUBE NO. 19

DATE 7-29-83

INSPECTORS

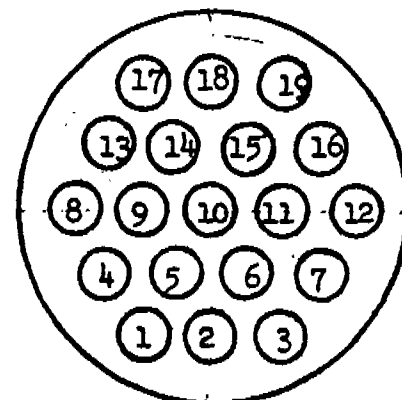
CK/DB

EQUIPMENT NUMBER OF INSTRUMENT USED TO RECORD DATA _____

TRANSDUCER TYPE _____

	NORTH	EAST	SOUTH	WEST
*0 ft.				
1 ft.				
2 ft.				
3 ft.	.45	.41	.43	
4 ft.	.43	.41	.43	.43
5 ft.	.47	.45	.43	.43
6 ft.	.45			.45
7 ft.				
8 ft.				
9 ft.				
10 ft.				
11 ft.				
**12 ft.				

NORTH



Orientation of Reactor Tubes - Plan View at Top of Tubes.

Remarks _____

*2" From Top of Tube.

**2" From Bottom of Tube.