

HEAT EXCHANGER SPECIFICATION SHEET

Customer	KP ENGINEERING / HOLLY FRONTIER		Reference No.	PO#J1422-B-008	
Address			Steeltex Job No.:	15S-3223A/B	
Plant Location	TULSA, OK		Date	9/30/2015	Rev 1
Service of Unit	UNIFINER STRIPPER BTMS TRIM COOLER		Item No.	004-E-503 A / B	
Size	25 x 240	inch	Type	AEU	Horizontal
Surf/Unit (Gross/Eff)	3015.9 / 2987.7	ft2	Shell/Unit	2	Surf/Shell (Gross/Eff) 1508 / 1493.8 ft2

PERFORMANCE OF ONE UNIT

Fluid Allocation		Shell Side		Tube Side	
Fluid Name		UNIFINER SPLITTER BOTTOMS		COOLING WATER	
Fluid Quantity, Total lb/hr		140689		138839	
Vapor (In/Out)					
Liquid		140689	140689	138839	138839
Steam					
Water				138839	138839
Noncondensables					
Temperature (In/Out) F		120.00	92.00	87.00	101.50
Specific Gravity		0.6671	0.6878	0.9961	0.9933
Viscosity cP		0.3150	0.3150	0.7880	0.6704
Molecular Weight, Vapor					
Molecular Weight, Noncondensables					
Specific Heat Btu/lb-F		0.5050	0.5050	0.9988	0.9986
Thermal Conductivity Btu/hr-ft-F		0.0640	0.0640	0.3559	0.3623
Latent Heat Btu/lb					
Inlet Pressure psia		138.10		54.700	
Velocity ft/sec		1.58		3.31	
Pressure Drop, Allow/Calo psi		15.000	10.489	8.000	8.760
Fouling Resistance (mIn) ft2-hr-F/Btu		0.00200		0.00200	
Heat Exchanged 2010476 Btu/hr		MTD (Corrected) 7.8 F			
Transfer Rate, Service 85.93 Btu/ft2-hr-F		Clean 166.45 Btu/ft2-hr-F	Actual 94.55 Btu/ft2-hr-F		

CONSTRUCTION OF ONE SHELL

Sketch (Bundle/Nozzle Orientation)

		Shell Side		Tube Side	
Design/Test Pressure psig		400 / FV /		325 / FV /	
Design Temperature F		400 / 300 / -20		150 / 300 / -20	
No Passes per Shell		1		4	
Corrosion Allowance inch		0.125 on c. steel		0.125 on c. steel	
Connections	In inch	1 @ 6"-300# RF		1 @ 6"-300# RF	
	Out inch	1 @ 6"-300# RF		1 @ 6"-300# RF	
	Rating Intermediate				
Tube No. 192U	OD 0.7500 inch	Thk(Avg) 0.0830 inch	Length 20,000 ft	Pitch 1,000 inch	
Tube Type Plain	Material 2205 DUPLEX SA-789 (S31803)				Tube pattern 45
Shell SA-516-70	ID 25.000	OD	Inch	Shell Cover	(Integ.)
Channel or Bonnet SA-516-70	Channel Cover SA-516-70				
Tubesheet-Stationary DUPLEX 2205	Tubesheet-Floating				
Floating Head Cover	Impingement Plate Circular plate				
Baffles-Cross 304SS (vert cut)	Type Single-Seg.	%Cut (Diam) 17.22	Spacing(c/c) 6.4689	Inlet	Inch
Baffles-Long	Seal Type				
Supports-Tube	U-Bend				
Bypass Seal Arrangement 1 pairs seal strips	Tube-Tubesheet Joint		Expanded (2 grooves)		
Expansion Joint	Type				
Rho-V2-Inlet Nozzle	lb/ft-sec2	Bundle Entrance	Bundle Exit	lb/ft-sec2	
Gaskets-Shell Side	Tube Side				
-Floating Head					
Code Requirements ASME SECT VIII DIV I	TEMA Class R				
Weight/Shell lb	Filled with Water	lb	Bundle	lb	

1. UNIT IS THERMALLY & MECHANICALLY GUARANTEED 2. EXCHANGERS ARE TO BE STACKED
 3. FLOWS & DUTY INCREASED BY 15. PERC 4. CERMAKOTE INTERNAL COATING OF CHANNEL & MAGNESIUM ANODES SHALL BE INSTALLED IN CHANNELS

CERTIFIED AS BUILT

CERTIFIED FOR CONSTRUCTION
 BY: SK DATE: 2/24/16

DESIGN DATA	SHELL	TUBE
DESIGN PRESSURE P.S.I.G.	400	325
VACUUM PRESSURE P.S.I.G.	FV AT 300°F	FV AT 300°F
TEST PRESSURE P.S.I.G.	SEE MAMP NOTE	SEE MAMP NOTE
DESIGN TEMP. Deg.F.	400	150
MMT Deg. F.	-20	-20
CORROSION ALLOWANCE	1/8"	1/8"
NUMBER OF PASSES	1	4
RADIOGRAPHY	SPOT	SPOT
HEAT TREAT REQUIRED	NO	YES
ESTIMATED WEIGHTS, LBS.		
DRY:	BUNDLE: 7100	NET: 17400

ASME CODE SECT. VIII DIV.1, 2013 ED. (STAMP YES)
 TEMA CLASS R and API-660 APPLIES
 NATIONAL BOARD REGISTRATION REQUIRED
 HOLLY SPECS: EP7-1-1; EP7-1-4; EP7-1-5; EP7-1-7; EP8-1-1; EP8-1-8; EP8-1-9; EP10-3-1; EP10-3-4; EP10-3-5.

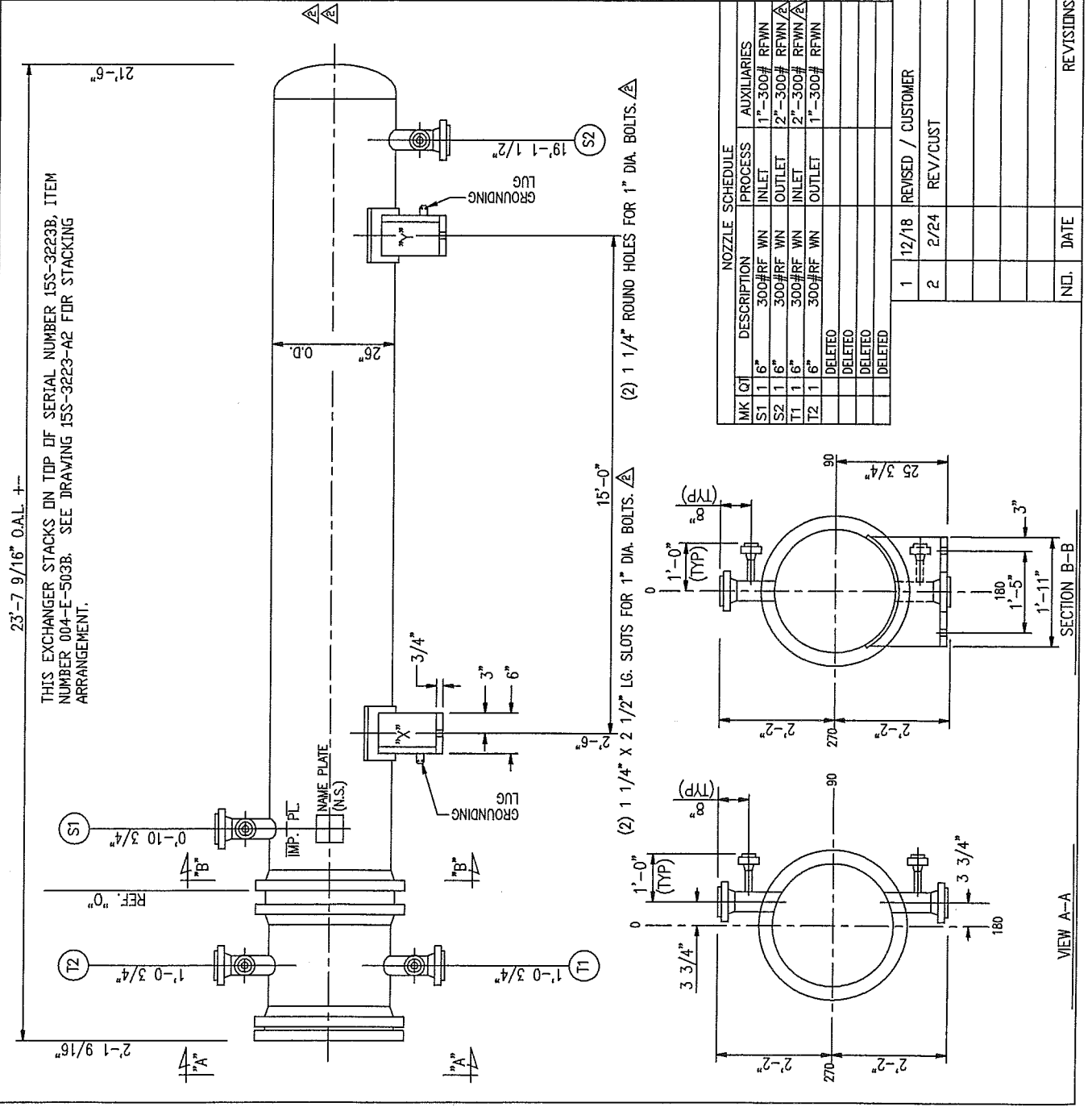
MATERIAL

CHANNEL: SA-516-70
 SHELL: SA-516-70
 TUBESHEETS: SA-182F51
 BAFFLES: SA-240-304
 TUBES: SA-789S31803 WEL0E0
 (192) 3/4" O.D.X 0.083" (A.W.) X 20'-0" STR. LGTH.
 TUBE PITCH 1" SURFACE 1574 SQ.FT. Δ

GENERAL NOTES

ALL BOLT HOLES TO STRADDLE NATURAL CENTER LINES.
 MAMP HOT AND CORRODED;
 SHELLSIDE: 410 PSIG LIMITED BY NOZZLE REINFORCEMENT
 TUBESIDE: 325 PSIG LIMITED BY CHANNEL COVER
 MAMP (NEW AND COLD);
 SHELLSIDE: 487 PSIG LIMITED BY BODY FLANGE
 TUBESIDE: 343 PSIG LIMITED BY CHANNEL COVER
 SHOP HYDROTEST PRESSURE: SHELLSIDE: 634 PSIG
 TUBESIDE: 446 PSIG
 FIELD HYDROTEST PRESSURE: SHELLSIDE: 533 PSIG
 TUBESIDE: 423 PSIG
 GASKETS: .1570" THK. 316 GMGC
 2 SETS OF SPARE GASKETS REQUIRED.
 PAINT: SEE PAINT MAP DRAWING PM
 INSULATION THK. (BY OTHERS): SHELL - NONE CHANNEL - NONE
 CUST: KP ENGINEERING/HOLLY FRONTIER
 P.O. NO.: J1422-B-008
 ITEM NO.: 004-E-503A, J-1422
 SERVICE: UNIFINER STRIPPER BTMS TRIM COOLER

ASSEMBLY AND SPECIFICATIONS FOR	
ONE	25-240 A E U
DWN. BY	SK
DATE	11-5-15
CKD. BY	DD
DWG. NO.	155-3223-A



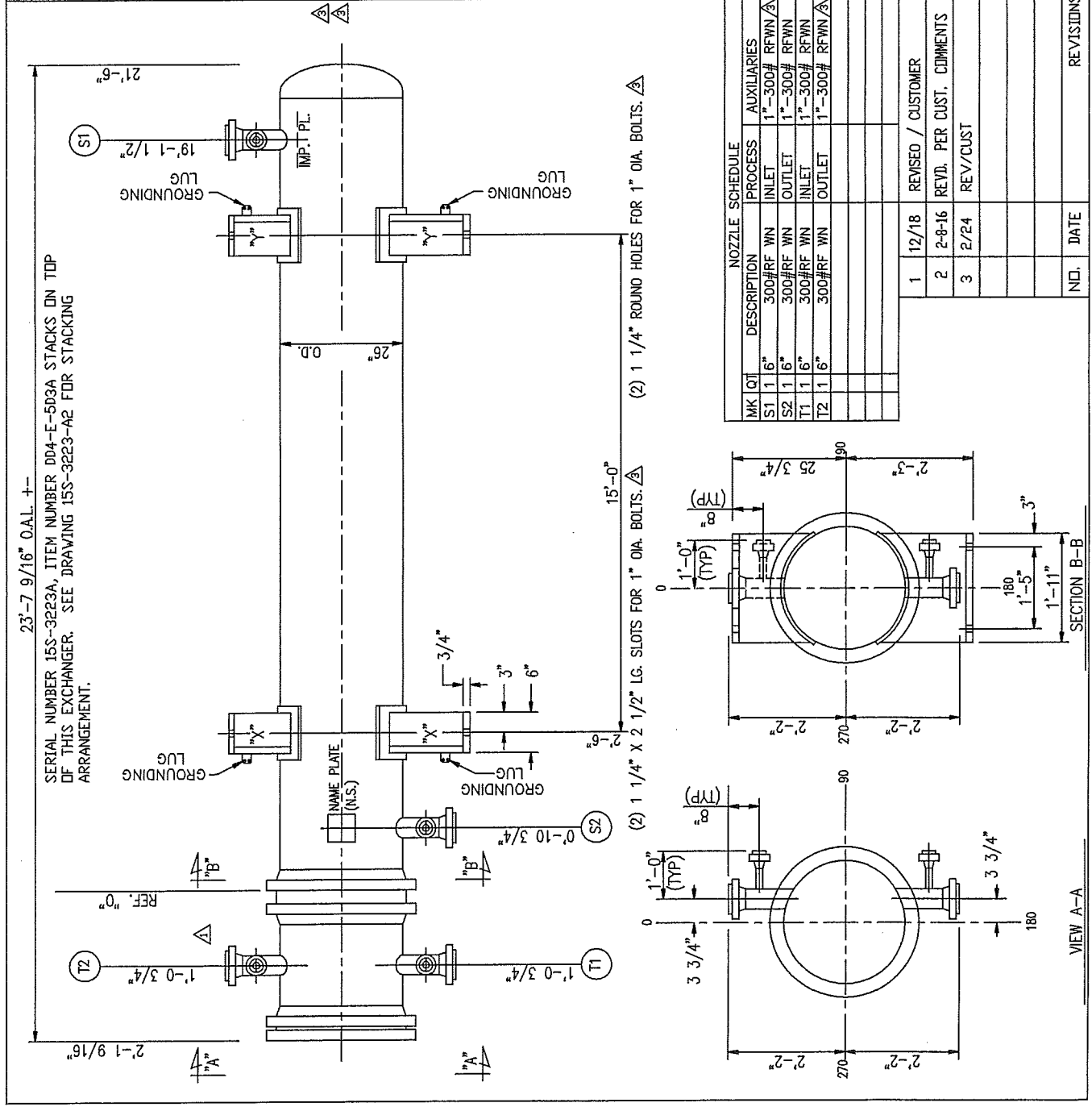
Steeltek
 TULSA, OK.

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TEST PRESSURE P.S.I.G. SEE MAMP NOTE	400	SEE MAMP NOTE
DESIGN TEMP. Deg.F. -20	150	150
MONI. Deg. F. -20	178"	178"
CORROSION ALLOWANCE 1/8"	1	4
NUMBER OF PASSES 1	SPOT	SPOT
RADIOGRAPHY NO	YES	YES
HEAT TREAT REQUIRED NO	ESTIMATED WEIGHTS, LBS.	
	BUNDLE: 7100	NET: 17400
DRY: 12400	SPECIFICATIONS	
	ASME CODE SECT. VIII DIV.1, 2013 ED. (STAMP YES)	
	TEMA CLASS R and API-660 APPLIES	
	NATIONAL BOARD REGISTRATION REQUIRED	
	HOLLY SPECS: EP7-1-1; EP7-1-4; EP7-1-5; EP7-1-7; EP8-1-1; EP8-1-8; EP8-1-9; EP10-3-1; EP10-3-4; EP10-3-5.	
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SHELL: SA-516-70		
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BAFFLES: SA-240-304		
TUBES: SA-789S31803 WELDED		
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	CUST: KP ENGINEERING/HOLLY FRONTIER	
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	ITEM NO.: 004-E-503B, J-1422	
	SERVICE: UNIFINER STRIPPER BTMS TRIM COOLER	



MK QTY	DESCRIPTION	PROCESS	AUXILIARIES
S1	1 6\"/>		
S2	1 6\"/>		
T1	1 6\"/>		
T2	1 6\"/>		

NO.	DATE	REVISED / CUSTOMER	REV. PER CUST.	COMMENTS	DT/DD
1	12/18				
2	2-8-16				
3	2/24				

ASSEMBLY AND SPECIFICATIONS FOR
ONE 25-240 A E U

DWN. BY SK
DATE 11-5-15
CKD. BY DD

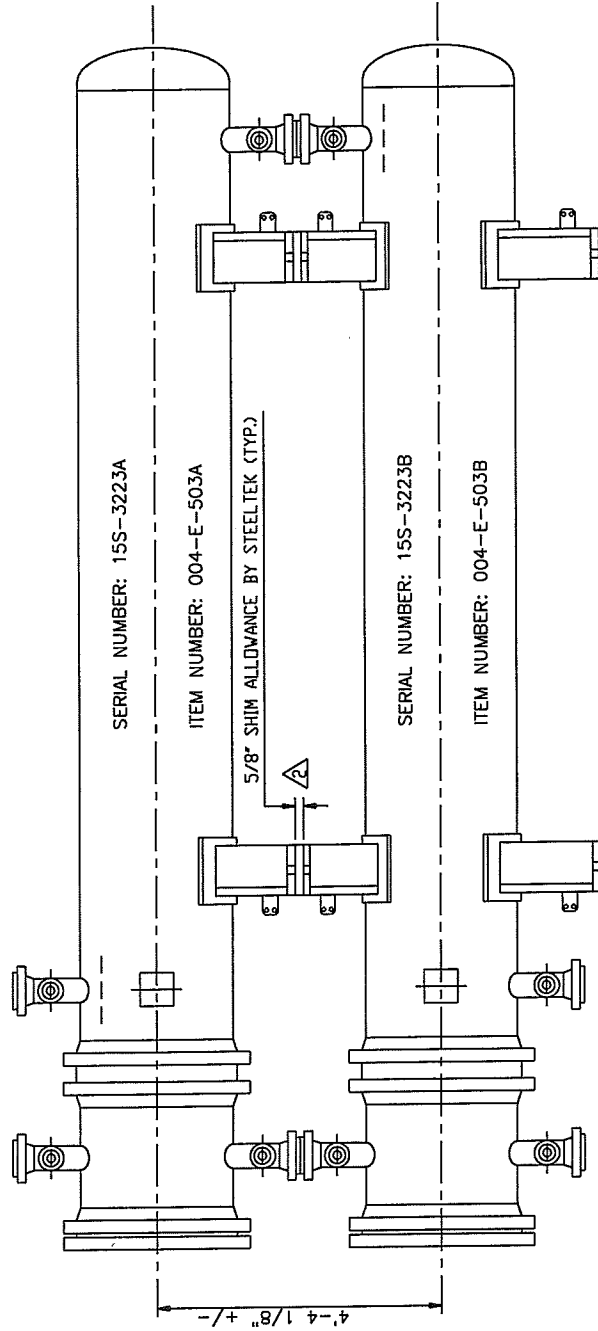
15S-3223-A1



TULSA, OK.

DWG. NO. 15S-3223-A1

CERTIFIED
AS BUILT



CUSTOMER: KP ENGINEERING/HOLLY FRONTIER
 P.I. NO.: J1422-B-008
 TAG: 004-E-503A/B
 SERVICE: UNIFINER STRIPPER BTMS TRIM COOLER

REVISED / CUSTOMER		STACKING ARRANGEMENT	
1	12/21	REVISED / CUSTOMER	07/00
2	2-3-16	REVO. PER CUST. COMMENTS	
		DWN. BY	SK
		DATE	11-5-15
		CKD. BY	DD
		REVISIONS	
		DWG. NO.	15S-3223-A2

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 TULSA, OK.