Petty, Randal L

From: Thompson, Jeremy E
Sent: Tuesday, September 18, 2007 10:52 AM
To: Petty, Harold L; Petty, Randal L
Cc: Lautigar, Ronald R; Milligan, Mancil W Jr; Nathan, Larry B
Subject: KIF Gyp Pond - Advatech Electrical Prelim Schedule

Lynn,

Here is the preliminary schedule that Ron Lautigar laid out with Advatech last week concerning electrical design of the Kingston Gypsum Pond Power Supply.

Oct 07 - Engineering Start
Jan 08 - Issue Package for Bid (MCC Building)
Mar 08 - Award Package (MCC Building)
Mar 09 - Material Delivery
Mar 09 - Construction Start
June 09 - Electrical Installation Complete

Regards,

Jeremy Thompson
Project Engineer
FGD Project Team
Tennessee Valley Authority
Phone: 423-751-8221
Fax: 423-751-7094

Model: VIC	Size: 20EHC	60Hz	RPM: 890	Stages: 1

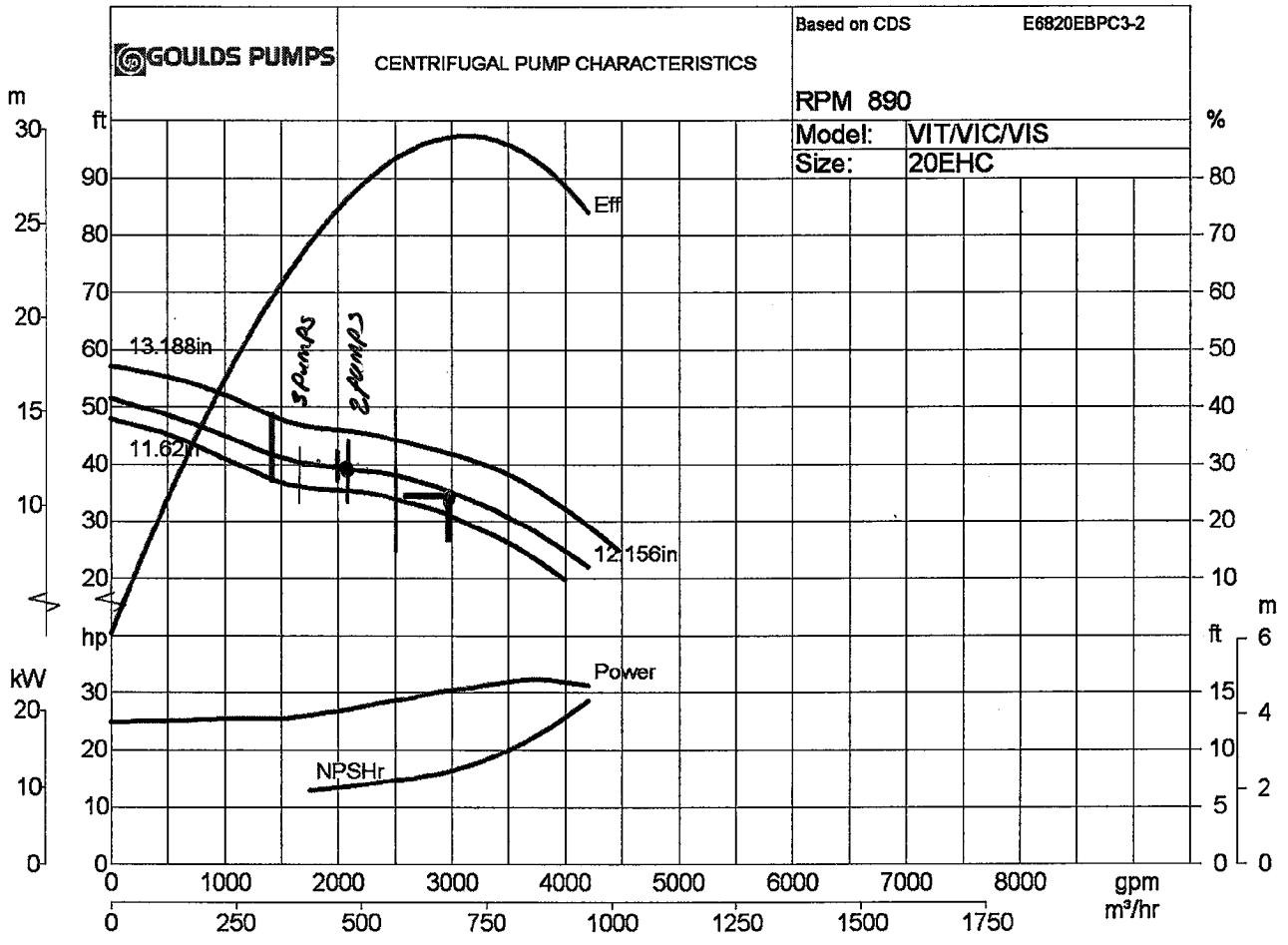
Job/Inq.No. :
Purchaser : UNDEFINED
End User : Issued by : Randal Petty
Item/Equip.No. : ITEM 001 Quotation No. : RP07-08-02 01 Date : 08/02/2007
Service :
Order No. :

Operating Conditions

Liquid:	Water	Bowl efficiency:	87.0 %	Suction Specific Speed:	9,920 gpm(US) ft
Temp.:	70.0 deg F	Actual Pump Power:	30.5 hp	Min. Hydraulic Flow:	1,417.8 gpm
S.G./Visc.:	1.000/1.000 cp	Total Power Loss:	0.00 hp	Min. Thermal Flow:	N/A
Flow:	3,000.0 gpm	Rated Total Power:	30.5 hp		
TDH:	35.0 ft	Imp. Dia. First 1 Stg(s):	12.1563 in		
NPSHa:		NPSHr:	8.2 ft	Non-Overloading Power:	32.2 hp
Solid size:		Shut off Head:	51.5 ft		
% Solids:		Vapor Press:			
Max. Solids Size:	1.7500 in				

Pump Performance

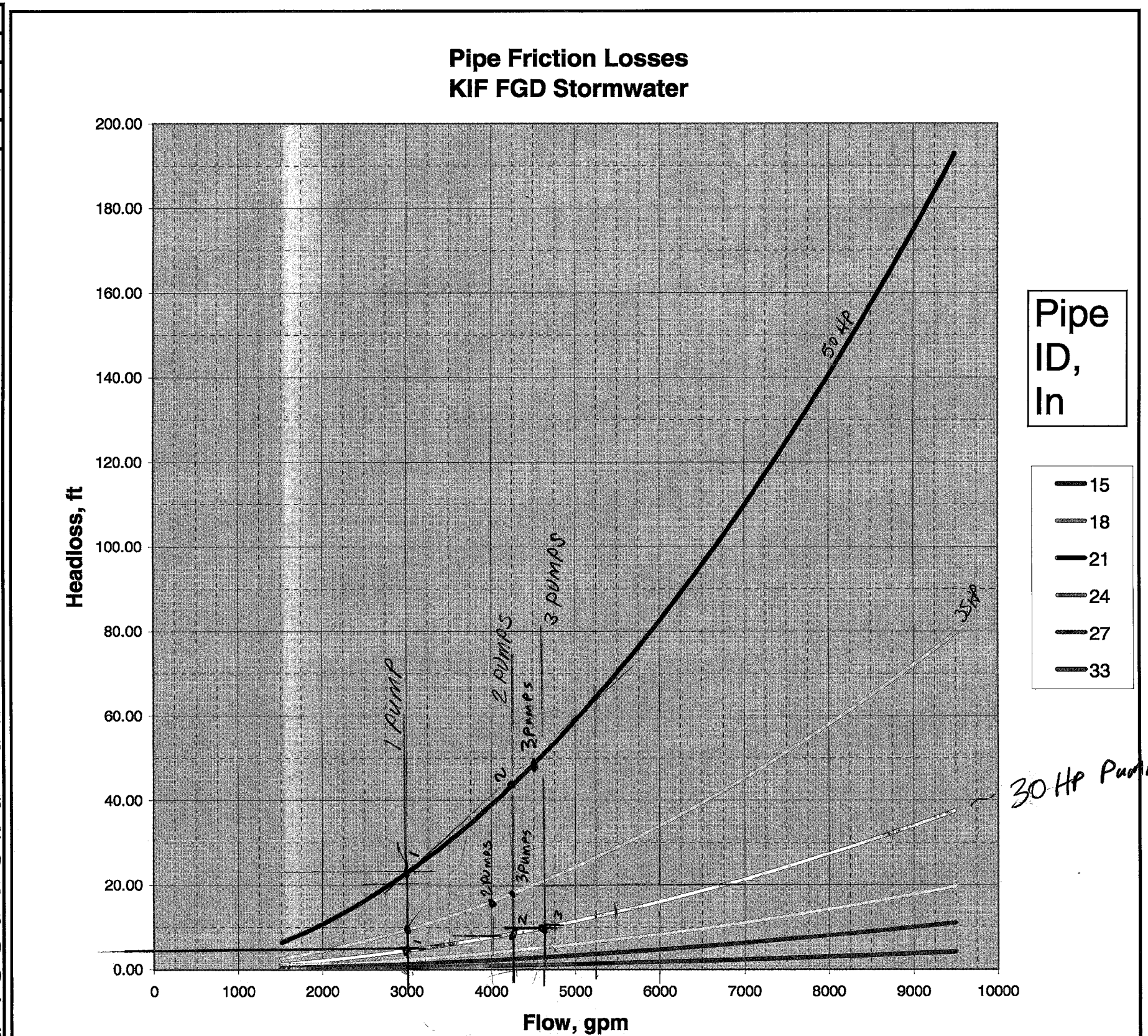
Notes: 1. The Mechanical seal increased drag effect on power and efficiency is not included, unless the correction is shown in the appropriate field above. 2. Magnetic drive eddy current on power and efficiency is not included. 3. Elevated temperature effects on performance are not included. 4. Non Overloading power does not reflect v-belt/gear losses.



21" ID PIPE

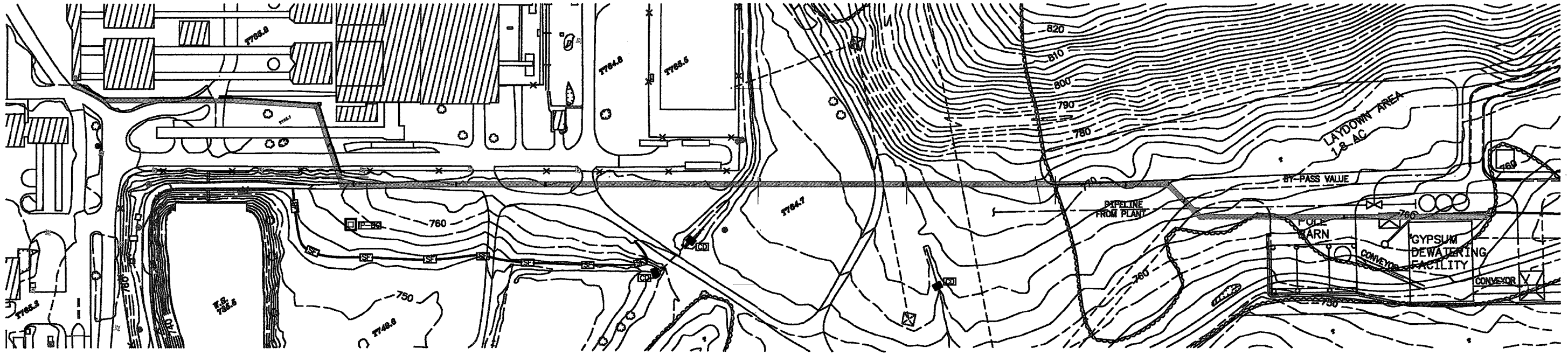
ITT

Friction Headloss, ft (Hazen Williams Method)							
C (hw)	120	Net Pipe ID, in					
L, ft	3000	15	18	21	24	27	33
Flow		Net Area, ft^2					
gpm	cfs	1.23	1.77	2.41	3.14	3.98	5.94
1500	3.34	6.35	2.61	1.23	0.64	0.36	0.14
1750	3.90	8.44	3.48	1.64	0.86	0.48	0.18
2000	4.46	10.81	4.45	2.10	1.10	0.62	0.23
2250	5.01	13.44	5.53	2.61	1.36	0.77	0.29
2500	5.57	16.33	6.72	3.18	1.66	0.93	0.35
2750	6.13	19.48	8.02	3.79	1.98	1.11	0.42
3000	6.68	22.88	9.42	4.45	2.32	1.31	0.49
3250	7.24	26.53	10.92	5.16	2.69	1.52	0.57
3500	7.80	30.43	12.53	5.92	3.09	1.74	0.66
3750	8.36	34.57	14.23	6.72	3.51	1.98	0.74
4000	8.91	38.96	16.04	7.57	3.95	2.23	0.84
4250	9.47	43.58	17.94	8.47	4.42	2.49	0.94
4500	10.03	48.44	19.95	9.42	4.92	2.77	1.04
4750	10.58	53.54	22.04	10.41	5.43	3.06	1.15
5000	11.14	58.87	24.24	11.45	5.98	3.37	1.27
5250	11.70	64.43	26.53	12.53	6.54	3.69	1.39
5500	12.25	70.22	28.91	13.65	7.13	4.02	1.51
5750	12.81	76.23	31.39	14.82	7.74	4.36	1.64
6000	13.37	82.48	33.96	16.04	8.37	4.72	1.78
6250	13.93	88.95	36.62	17.30	9.03	5.09	1.92
6500	14.48	95.64	39.38	18.60	9.71	5.47	2.06
6750	15.04	102.56	42.23	19.94	10.41	5.87	2.21
7000	15.60	109.70	45.17	21.33	11.14	6.28	2.36
7250	16.15	117.06	48.20	22.76	11.88	6.70	2.52
7500	16.71	124.63	51.32	24.23	12.65	7.13	2.69
7750	17.27	132.43	54.53	25.75	13.44	7.58	2.85
8000	17.83	140.44	57.82	27.31	14.26	8.04	3.03
8250	18.38	148.66	61.21	28.91	15.09	8.51	3.20
8500	18.94	157.11	64.69	30.55	15.95	8.99	3.39
8750	19.50	165.76	68.25	32.23	16.83	9.49	3.57
9000	20.05	174.63	71.90	33.96	17.73	9.99	3.76
9250	20.61	183.71	75.64	35.72	18.65	10.51	3.96
9500	21.17	193.00	79.47	37.53	19.59	11.04	4.16



Friction Losses Calculated by Hazen Williams Method, L = 3000 ft, C = 120. Does Not Include Elevation Changes Nor Fittings-Losses

DRAWING CHANGE AUTHORIZATION



KEY LOCATION PLAN
SCALE: NONE

LEGEND:

CD	CHECK DAM	MU	MULCHING
DL	DIVERSION BERM	FR	FILTER RING
OP	OUTLET PROTECTION	CE	CONSTRUCTION EXIT
SF	SILT FENCE	CRS	CONSTRUCTION ROAD STABILIZATION
BF	BUFFER ZONE	IP-SF	INLET PROTECTION SILT FENCE
RR	RIPRAP	DW	DE-WATERING STRUCTURE
TS	TEMP. SEEDING	IP-BG	BLOCK & GRAVEL INLET PROTECTION
PS	PERM. SEEDING		

NOTE:
1. FOR GENERAL NOTES SEE SHEET 6.
2. CONTOURS & GRADES SHOWN REPRESENT EXPECTED CONFIGURATION UPON COMPLETION. ACTUAL CONFIGURATION MAY VARY.
3. FIELD TO PLACE CRUSHED STONE BENEATH ALL OFFICE BUILDINGS & TOOL TRAILERS AS NECESSARY.
4. SILT FENCE AND STRAW BALES MAY BE REMOVED ONCE AN AREA IS STABILIZED.

TVA
CIVIL
GYPSUM EFFLUENT LINES
EROSION CONTROL
0 SK-KIFSMPPP-19A

0	CWH 07/03/2007	VJD 07/03/2007	
Rev.	Prepared/Date	Checked/Date	Change Reference
Contract No.	N/A		
DCA Prerequisites	N/A		
Appl. Dwg. No.	SK-KIFSMPPP-19A	SECT SEC	
Discipline	CIVIL	UNIT 1-9	

Attached Mass Drawing No.	Rev.
N/A	0
DCA No. N/A	0

Model: VIC	Size: 20EHC	60Hz	RPM: 890	Stages: 1

Job/Inq.No. :
Purchaser : UNDEFINED
End User : Issued by : Randal Petty
Item/Equip.No. : ITEM 001 Quotation No. : RP07-08-02 01 Date : 08/02/2007
Service :
Order No. :

Operating Conditions

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Flow:	3,000.0 gpm	Rated Total Power:	30.5 hp		
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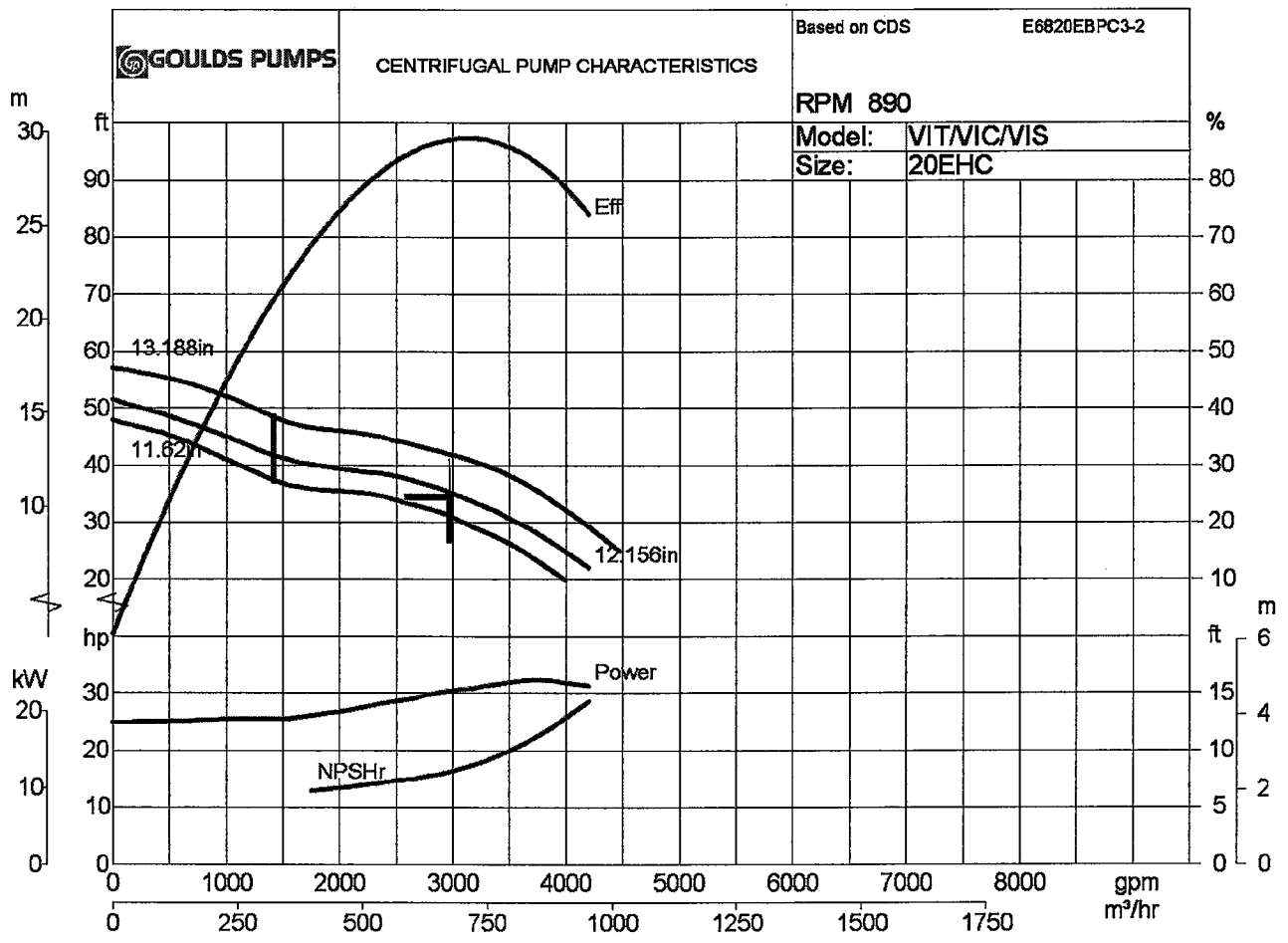
NPSHa:		NPSHr:	8.2 ft	Non-Overloading Power:	32.2 hp
Solid size:		Shut off Head:	51.5 ft		
% Solids:		Vapor Press:			

Pump Performance

Max. Solids Size: 1.7500 in

Notes: 1. The Mechanical seal increased drag effect on power and efficiency is not included, unless the correction is shown in the appropriate field above. 2. Magnetic drive eddy current on power and efficiency is not included. 3. Elevated temperature effects on performance are not included. 4. Non Overloading power does not reflect v-belt/gear losses.



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Pump Performance @ 890 RPM

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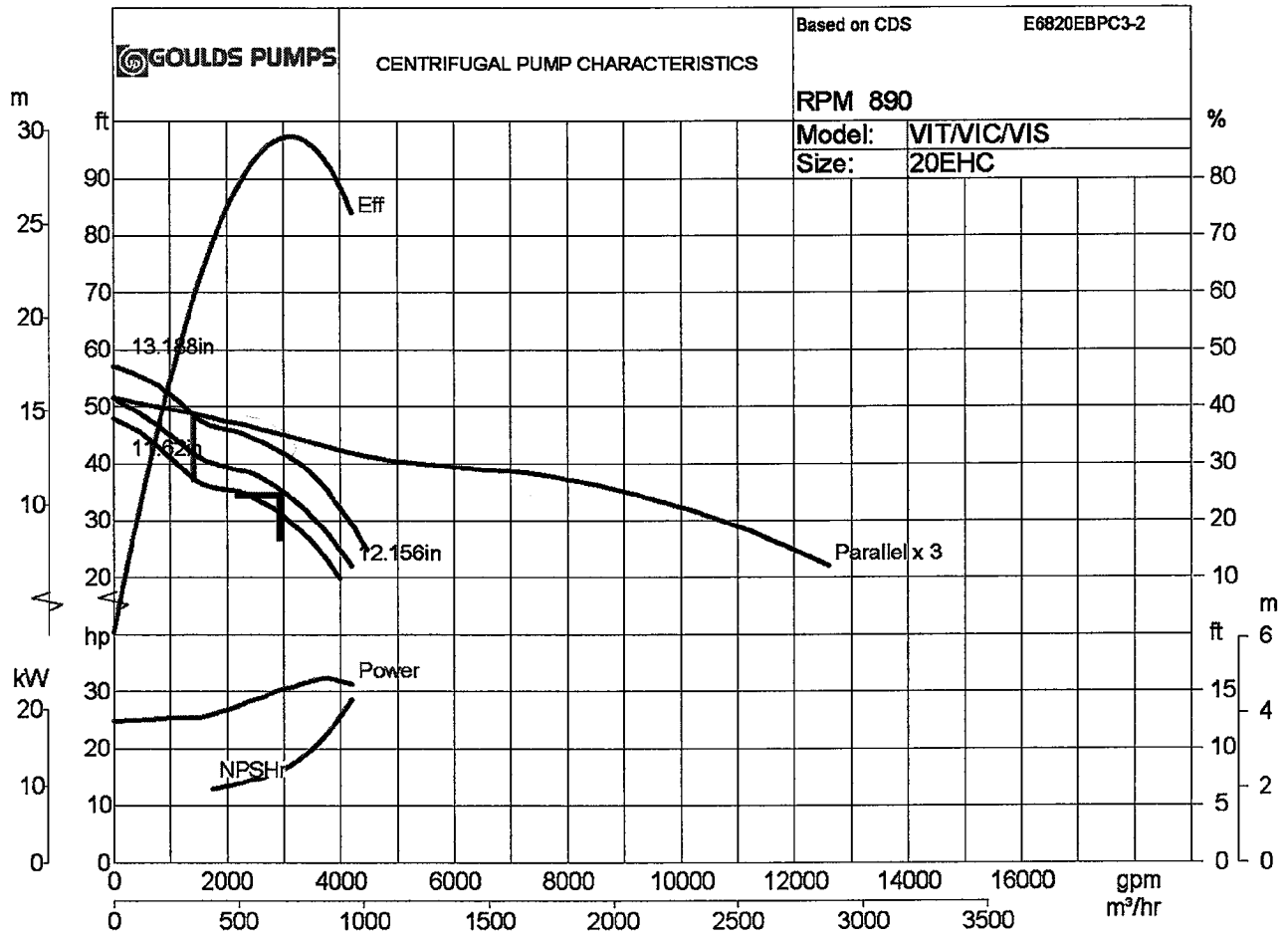

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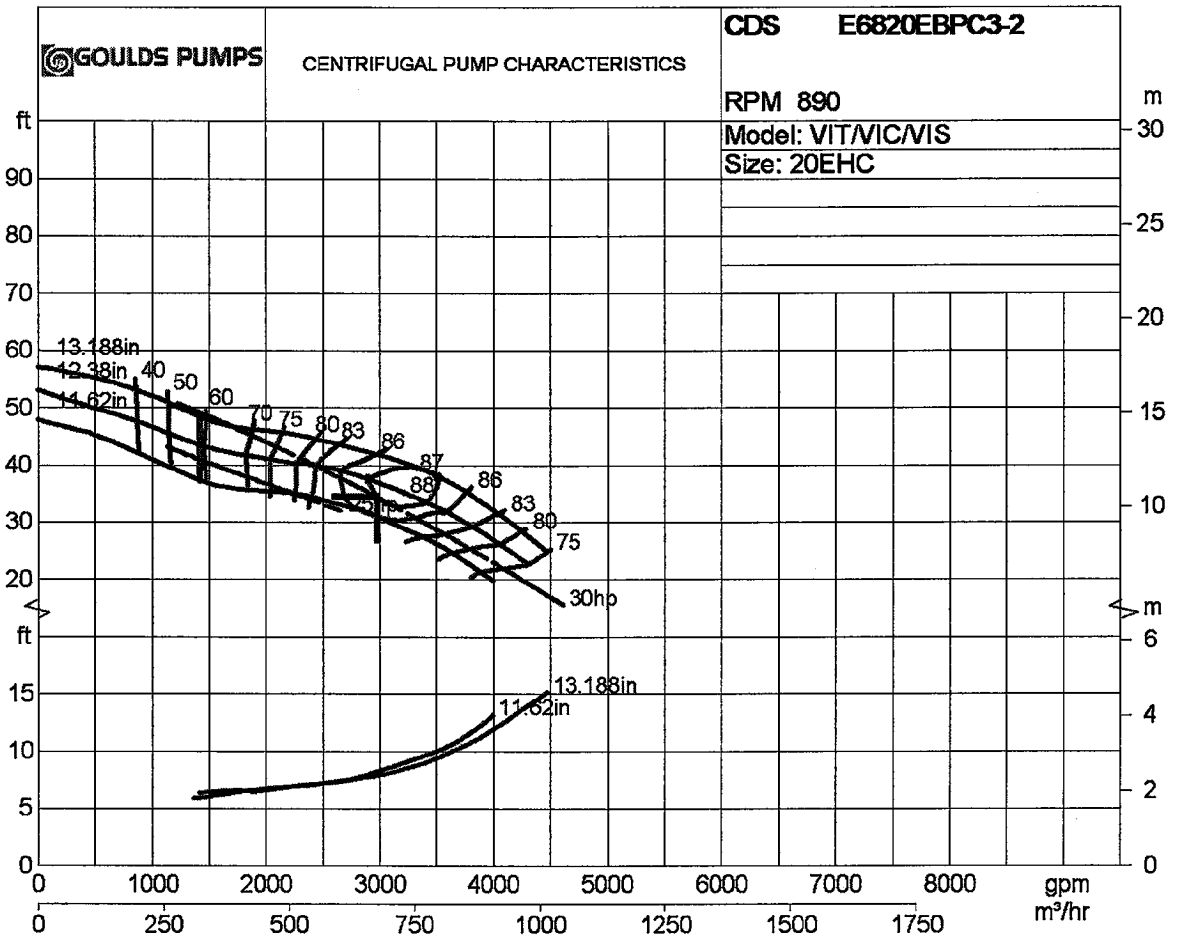

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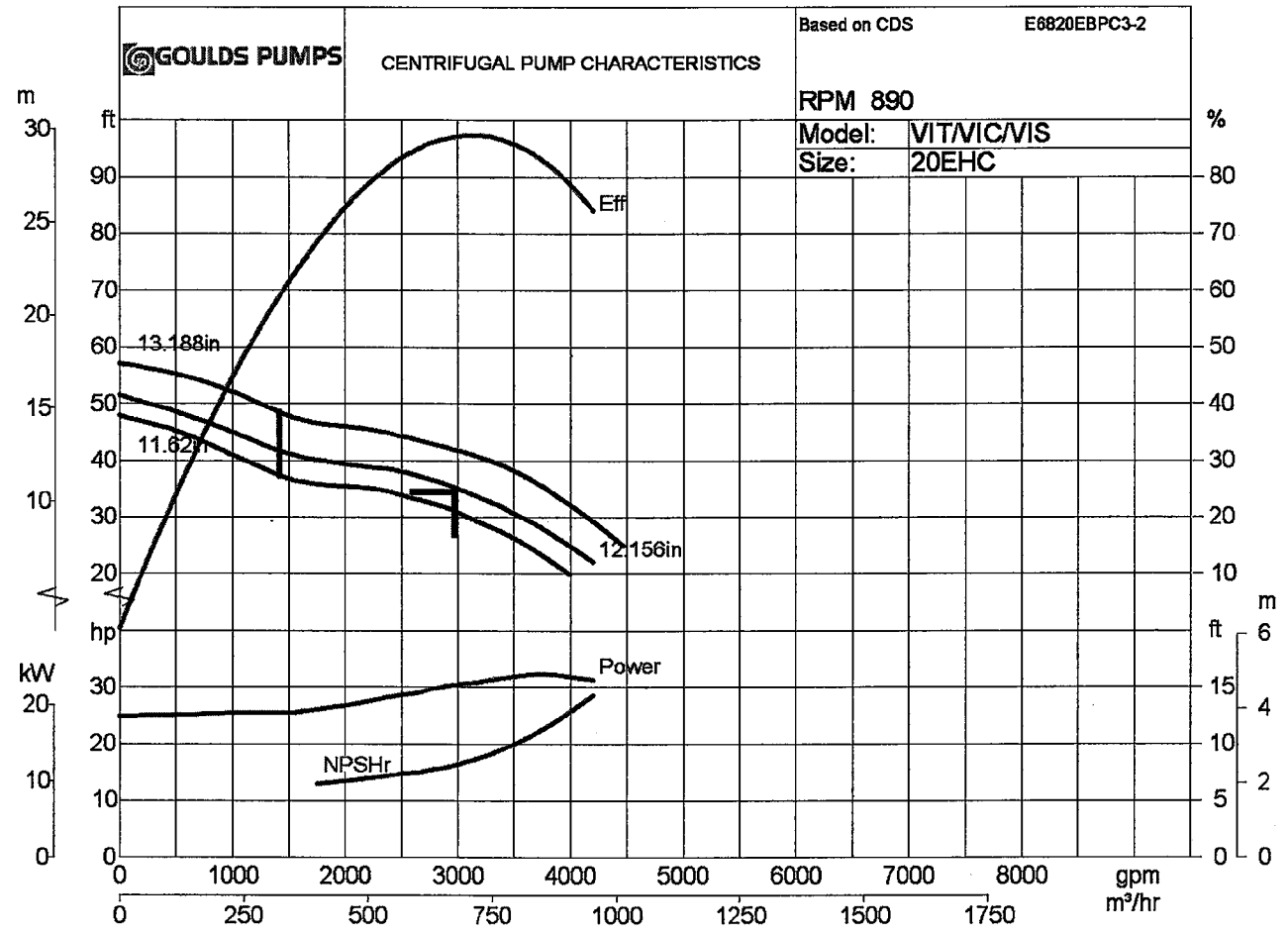
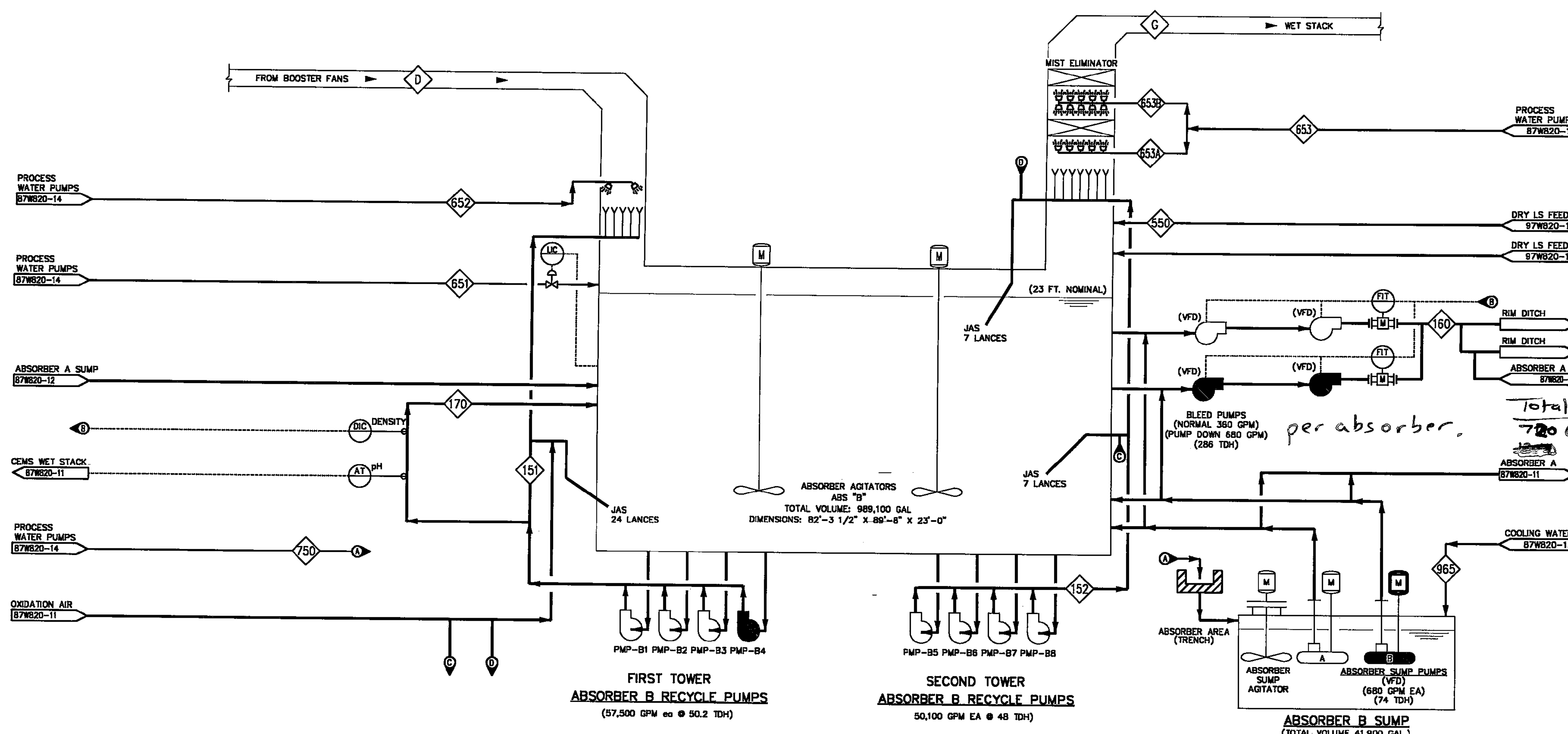


36 | M | 87W820-12

NOTES:

1. ALL DATA BASED ON 3.1 POUND COAL AND 98% SULFUR REMOVAL.
2. 100% OF HF AND HCL IN FLUE GAS IS ASSUMED TO BE ABSORBED IN THE SCRUBBING LIQUID. 50% OF SULFURIC ACID IS ASSUMED TO BE ABSORBED IN THE SCRUBBING LIQUID. NO MgCO3 DISSOLUTION IS CONSIDERED.
3. CEMS EQUIPMENT TO BE PROVIDED BY TVA AND INSTALLED BY ADVATECH.
4. NORMALLY IDLE EQUIPMENT SHOWN BLACK OR BOLD OUTLINE
5. EQUIPMENT SIZED FOR 5.0 lb COAL



EXTENSIVE REVISIONS

(NOTE 1)

STREAM NO.	D		G	H
IDENTIFICATION	ABSORBER B INLET		ABSORBER B OUTLET	OXIDATION AIR FLOW
VOLUME – ACFM x 1000	2,799		2,347	7.34
VOLUME – SCFM x 1000 (at 68 F)	1,889		2,054	10.8
TEMPERATURE – °F	321		130	212
PRESSURE – IN. W.G. (PSIG)	9.5		1.1	13.2
TOTAL GAS x 1000 LB/HR	8,634		9,104	48
DRY GAS x 1000 LB/HR	8,226		8,255	48
H2O VAPOR x 1000 LB/HR	408		850	0
SO2 – LB/HR	22,274		445	0
SO2 – ppm(d)	1,280		25	0
SO3 – LB/HR	217		109	0
SO3 – ppm(d)	10		5	0
HCL – LB/HR	224		0	0
HCL – ppm(d)	23		0	0
HF – LB/HR	47		0	0
HF – ppm(d)	9		0	0
ENTRAINED H2O – LB/HR	0		611	0
FLYASH – gr/dscf	0.0069		0.0035	0
FLYASH – LB/HR	103		52	0

STREAM NO.	151	152	160	170	550	651	652	653	653A	653B	965	750
IDENTIFICATION	1st RCF	2nd RCF	ABS BLEED	SLURRY/ph/DENSITY SAMPLE FLOW	LS TO ABS	ABS MAKE UP	W/D WASH	MSTE WASH	ME WASH	ME WASH	ABS B SUMP CWR	TRENCH FLUSH
NORMAL FLOW – GPM	160,200	200,400	361	200	–	528	210	393	78	315	18	0
TEMPERATURE – °F	130	130	130	130	110	85	85	85	85	85	95	85
PRESSURE – PSIG	35	34	140	35	LATER	75	75	30	30	30	LATER	LATER
Cl (PPMW)	1,550	1,550	1,550	1,550	0	28	28	28	28	28	28	28
TOTAL WEIGHT – T/HR	47,954	59,988	108	60	20	145	52	88	16	72	6	0
WATER – T/HR	33,493	41,898	75	42	0	145	52	88	16	72	6	0
SUSPENDED SOLIDS – T/HR	14,386	17,996	32	18	20	0	0	0	0	0	0	0
SUSPENDED SOLIDS – WT%	30	30	30	30	100	–	–	–	–	–	–	–
DISSOLVED SOLIDS – T/HR	75	94	0.2	0.1	0.0	–	–	–	–	–	–	–
SPECIFIC GRAVITY	1.2	1.2	1.20	1.20	2.71	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MAXIMUM FLOW – GPM			–		–	528	210	789	391	789	35	150

ADVATECH REVISIONS – D – GENERAL REVISIONS – BTF SPH KPB 04/18/07

87W820-12 D ADVATECH

ADVATECH (TVA CTR PP-18244-9)

TASK COMPLETED BY: REV NO.

SCALE: NONE EXCEPT AS NOTED

FGD SYSTEM
UNITS 1-9

MECHANICAL
PROCESS FLOW DIAGRAM
FLUE GAS DESULFURIZATION SYSTEM ABS B

KINGSTON FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

AUTOCAD R05 | 36 | M | 87W820-12 | R

PLOT FACTOR:01 W_TVA

C.A.D. DRAWING DO NOT ALTER MANUALLY

Sent: Monday, May 07, 2007 9:02 PM
To: Petty, Harold L
Cc: Thompson, Jeremy E; Petty, Randal L
Subject: Re: KIF - Peninsula Gyp Disposal Area - Sed Pond Pump Rate - Line Size

Lynn
Here is a summary of the thinking that went in to the design of the pumps and force main. Please let me know if you need additional info.

Each of the three stormwater pumps at Pump Station "A" was to have a design capacity of 3,000 gpm.

The design philosophy for the pump station operations is for one pump to be a lead pump; one pump to be a lag pump; and the third pump to be an in line stand-by pump. Therefore, the maximum pumping capacity of Pump Station "A" is 9,000 gpm.

Our design bases for sizing the force main was to maintain a minimum scouring velocity of 2 ft/sec with one pump operating and a maximum velocity of 7 ft/sec with all three pumps running simultaneously.

For the design flow rate of 3,000 gpm (one pump running) the velocity in the 24" force main is 2.13 ft/sec. and at 9,000 gpm the design velocity in the 24" discharge is 6.38 ft/sec.

Neil

----- Original Message -----
From: Petty, Harold L <hlpetty@tva.gov>
To: Neil Davies
Cc: Thompson, Jeremy E <jethompson@tva.gov>; Petty, Randal L <rlpetty@tva.gov>
Sent: Mon May 07 14:38:30 2007
Subject: KIF - Peninsula Gyp Disposal Area - Sed Pond Pump Rate - Line Size

Neil:

Per our phone discussion a few minutes ago.

If you could track down the calculations regarding the preliminary pipe size (24" dia.) and the flow rate from the sed pond to the discharge channel, attach it to this e-mail, and "reply to all" it would be appreciated.

Thanks,
Lynn

H. L. Petty, PE

Principal Engineer
FES - Civil/Site

1101 Market Street
LP 2G-C
Chattanooga, TN 37402

423-751-6704
423-751-7094 (Fax)
423-838-1741 (Mobile)

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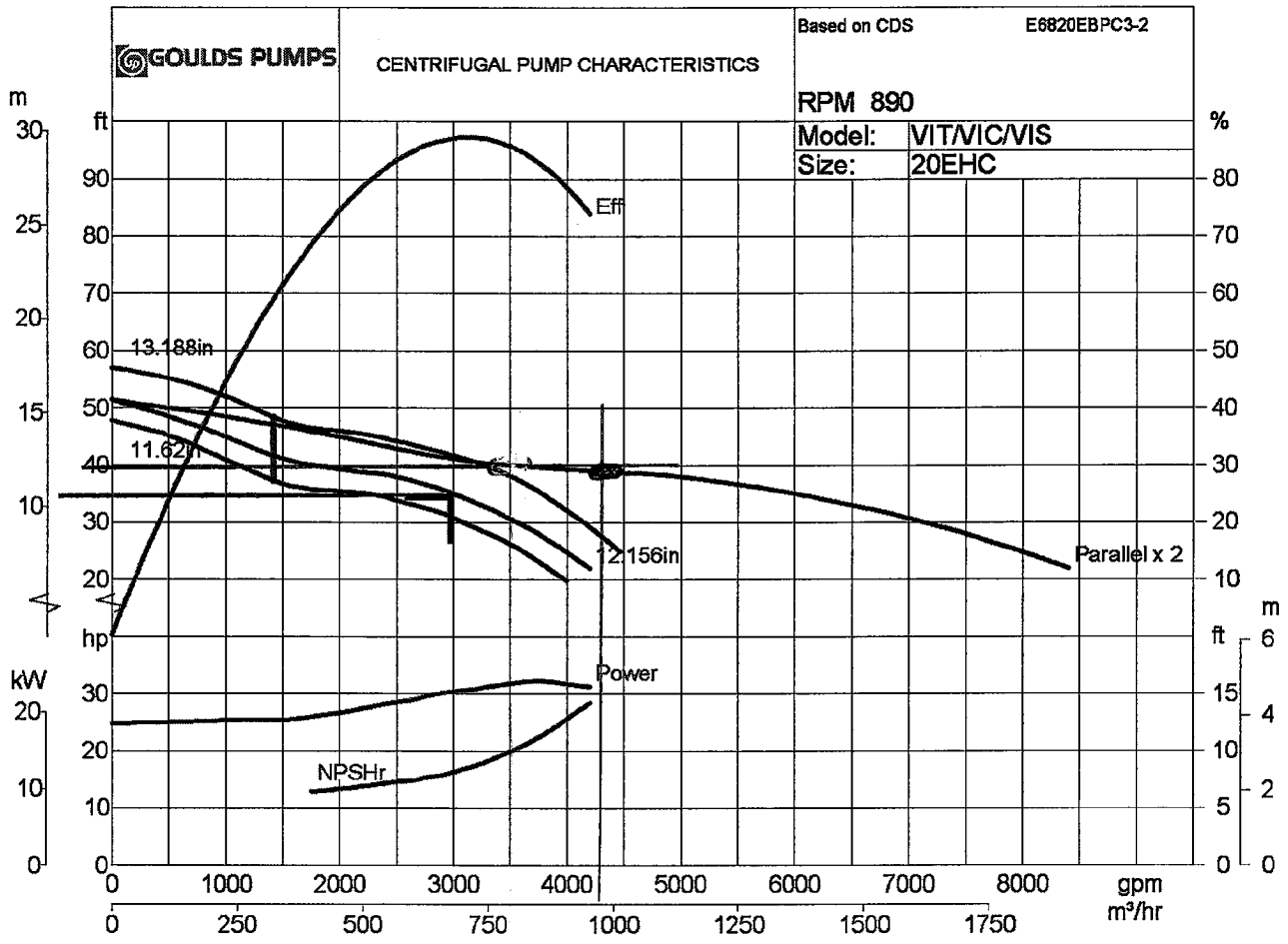

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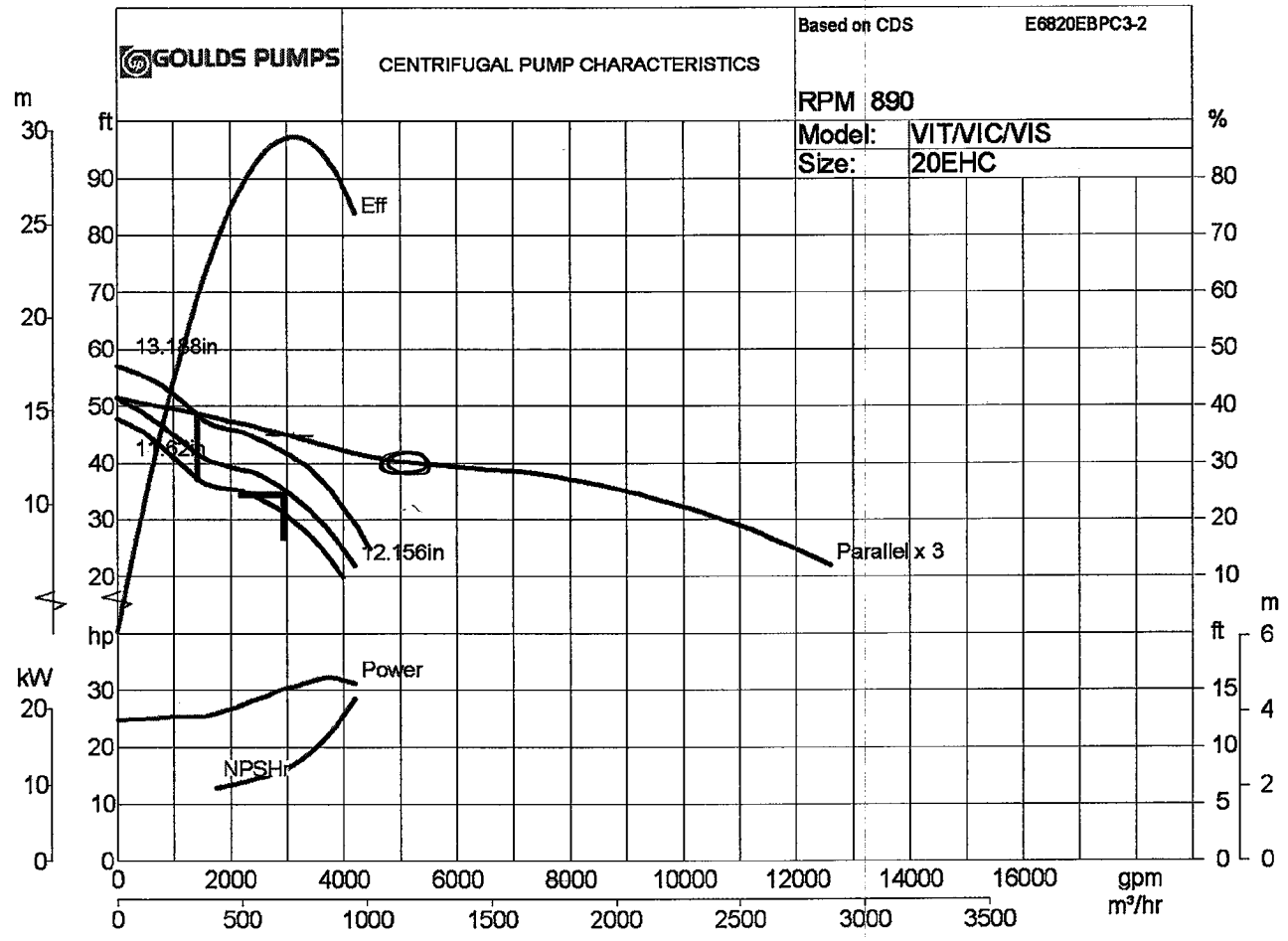

Friction Headloss, ft (Hazen Williams Method)							
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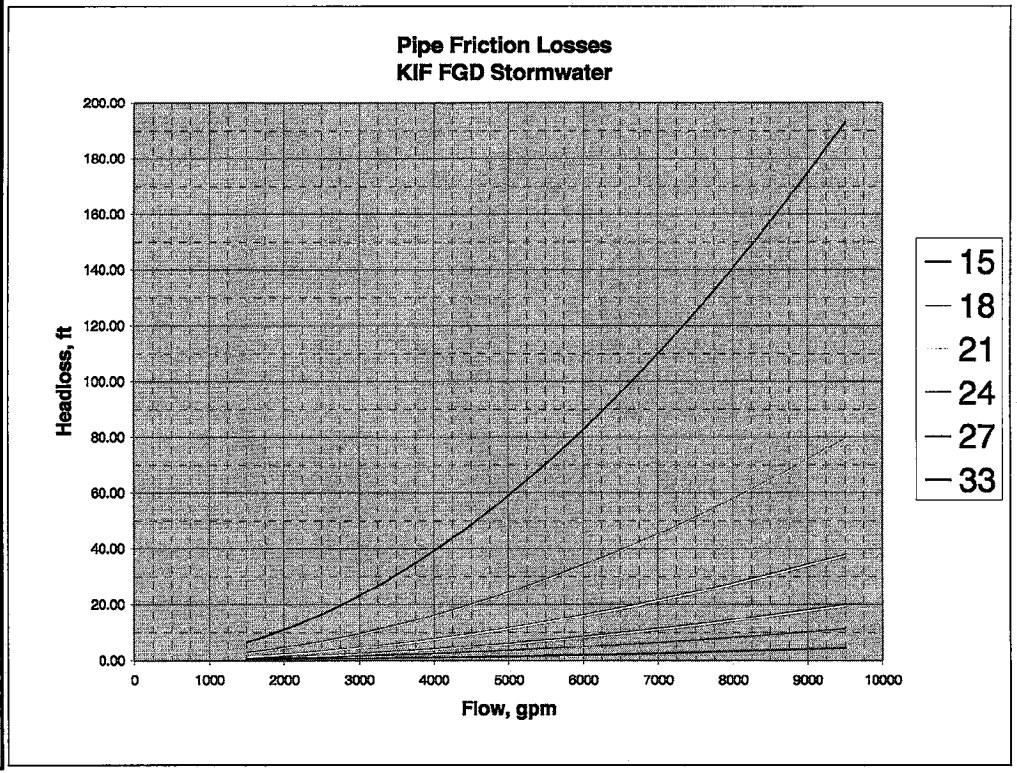
Flow		Net Area, ft^2					
gpm	cfs	1.23	1.77	2.41	3.14	3.98	5.94
1500	3.34	6.35	2.61	1.23	0.64	0.36	0.14
1750	3.90	8.44	3.48	1.64	0.86	0.48	0.18
2000	4.46	10.81	4.45	2.10	1.10	0.62	0.23
2250	5.01	13.44	5.53	2.61	1.36	0.77	0.29
2500	5.57	16.33	6.72	3.18	1.66	0.93	0.35
2750	6.13	19.48	8.02	3.79	1.98	1.11	0.42
3000	6.68	22.88	9.42	4.45	2.32	1.31	0.49
3250	7.24	26.53	10.92	5.16	2.69	1.52	0.57
3500	7.80	30.43	12.53	5.92	3.09	1.74	0.66
3750	8.36	34.57	14.23	6.72	3.51	1.98	0.74
4000	8.91	38.96	16.04	7.57	3.95	2.23	0.84
4250	9.47	43.58	17.94	8.47	4.42	2.49	0.94
4500	10.03	48.44	19.95	9.42	4.92	2.77	1.04
4750	10.58	53.54	22.04	10.41	5.43	3.06	1.15
5000	11.14	58.87	24.24	11.45	5.98	3.37	1.27
5250	11.70	64.43	26.53	12.53	6.54	3.69	1.39
5500	12.25	70.22	28.91	13.65	7.13	4.02	1.51
5750	12.81	76.23	31.39	14.82	7.74	4.36	1.64
6000	13.37	82.48	33.96	16.04	8.37	4.72	1.78
6250	13.93	88.95	36.62	17.30	9.03	5.09	1.92
6500	14.48	95.64	39.38	18.60	9.71	5.47	2.06
6750	15.04	102.56	42.23	19.94	10.41	5.87	2.21
7000	15.60	109.70	45.17	21.33	11.14	6.28	2.36
7250	16.15	117.06	48.20	22.76	11.88	6.70	2.52
7500	16.71	124.63	51.32	24.23	12.65	7.13	2.69
7750	17.27	132.43	54.53	25.75	13.44	7.58	2.85
8000	17.83	140.44	57.82	27.31	14.26	8.04	3.03
8250	18.38	148.66	61.21	28.91	15.09	8.51	3.20
8500	18.94	157.11	64.69	30.55	15.95	8.99	3.39
8750	19.50	165.76	68.25	32.23	16.83	9.49	3.57
9000	20.05	174.63	71.90	33.96	17.73	9.99	3.76
9250	20.61	183.71	75.64	35.72	18.65	10.51	3.96
9500	21.17	193.00	79.47	37.53	19.59	11.04	4.16



Petty, Randal L

From: Thompson, Jeremy E
Sent: Wednesday, August 01, 2007 9:09 PM
To: 'Kevin_Brown@URSCorp.com'; Milligan, Mancil W Jr
Cc: Sam_Hanlin@URSCorp.com; Mark_Steutermann@URSCorp.com; Nathan, Larry B; Cynthia_Bremer@URSCorp.com; Petty, Randal L; Petty, Harold L
Subject: KIF - Peninsula Gyp Disposal Area - Sed Pond Pump Rate - Line Size - NEED TO DISCUSS ASAP
Importance: High

Kevin/Woody,

We need to have a discussion on the line sizing in the morning. I have passed this information on to our Civil department who is designing the Gypsum Pond. They called this evening expressing concerns that using the 20" pipe will have a great effect on the pressure loss in the pipe at the max flow case and will therefore require to the Stormwater pond pumps be a much larger size than originally planned to accommodate the increased head required. What time are you guys be available tomorrow (Thursday) to discuss? I realize everybody's schedule is full, but we need to address this concern before we start putting pipe in the ground next week.

Thanks,

Jeremy Thompson
Project Engineer
FGD Project Team
Tennessee Valley Authority
Phone: 423-751-8221
Fax: 423-751-7094

From: Kevin_Brown@URSCorp.com [mailto:Kevin_Brown@URSCorp.com]
Sent: Tuesday, July 03, 2007 8:32 AM
To: Thompson, Jeremy E
Cc: Sam_Hanlin@URSCorp.com; Mark_Steutermann@URSCorp.com; Nathan, Larry B; Milligan, Mancil W Jr; Cynthia_Bremer@URSCorp.com
Subject: Re: FW: FW: KIF - Peninsula Gyp Disposal Area - Sed Pond Pump Rate - Line Size

A 20" DR 9 pipe has an average ID of 15.289". At 3000 gpm, the line velocity will be 5.2 ft/s, at 6000 gpm, the line velocity will be 10.5 ft/s, and at 9000 gpm, the line velocity will be 15.7 ft/s. The maximum recommended velocity for general service water is about 15 ft/s, so the line size was chosen such that we max out the allowable velocity at 9000 gpm.

Let me know if this answers your question.

Thanks

Kevin P. Brown
Mechanical Engineer
URS - Advatech
Phone: (913) 344-1020
Fax: (913) 344-1011

"Thompson, Jeremy E" <jethompson@tva.gov>

"Thompson, Jeremy E" **<jethompson@tva.gov>**

To<Kevin_Brown@URSCorp.com>
cc<Sam_Hanlin@URSCorp.com>
SubjectFW: FW: KIF - Peninsula Gyp Disposal Area - Sed Pond Pump Rate - Line Size

06/29/2007 03:02 PM

Kevin,

I see in the SCN to Bowen that Advatech is proposing a 20" return line from the Stormwater Pond to the Discharge channel. What is the recommended velocity of water through HDPE pipe?

Thanks,

Jeremy Thompson
Project Engineer
FGD Project Team
Tennessee Valley Authority
Phone: 423-751-8221
Fax: 423-751-7094

From: Thompson, Jeremy E
Sent: Friday, May 11, 2007 9:00 AM
To: 'Kevin_Brown@URSCorp.com'
Subject: RE: FW: KIF - Peninsula Gyp Disposal Area - Sed Pond Pump Rate - Line Size

9,000 GPM would be the max flow.

Jeremy Thompson
Engineering Design Representative
FGD Project Team
Tennessee Valley Authority
Phone: 423-751-8221
Fax: 423-751-7094

From: Kevin_Brown@URSCorp.com [mailto:Kevin_Brown@URSCorp.com]
Sent: Friday, May 11, 2007 9:00 AM
To: Thompson, Jeremy E
Cc: Nathan, Larry B; Mark_Steutermann@URSCorp.com; Milligan, Mancil W Jr; Lee, Timothy W; Sam_Hanlin@URSCorp.com; Cynthia_Bremer@URSCorp.com; Lloyd_Scott@URSCorp.com; Joe_Hernandez@URSCorp.com; Ronnie_Stewart@URSCorp.com
Subject: Re: FW: KIF - Peninsula Gyp Disposal Area - Sed Pond Pump Rate - Line Size

Thanks Jeremy, we'll have Cindy look at this and get a conceptual line size.

Obviously the 10 inch line size we had earlier was not even close if the flows you have below are what we need to size to.

One question, for the three 3,000 gpm pumps, are we to assume 3 x 50% (6,000 gpm max flow) or 3 x 33% (9,000 gpm max flow) for the flow and line sizing?

We will have to revise the SCN drawing, but I want to wait until we have the conceptual sizing done.

Ronnie, I would go ahead an tell Bowen the 10 inch is not correct, and we will need at least 24 in HDPE. We'll have to let you know on the DR.

Thanks

Kevin P. Brown
Mechanical Engineer
URS - Advatech
Phone: (913) 344-1020
Fax: (913) 344-1011

▼" height="16">"Thompson, Jeremy E" <jethompson@tva.gov>

"Thompson, Jeremy E" <jethompson@tva.gov>

05/08/2007 12:07 PM

To <Kevin_Brown@URSCorp.co:
cc "Milligan, Mancil W Jr" <mwmilligan@tva.gov>, "Natl Larry B" <lbnathan@tva.gov>; Timothy W" <twlee@tva.gov>
Subject FW: KIF - Peninsula Gyp Disp Area - Sed Pond Pump Rate - I

Kevin,

Here are some facts about the KIF Storm Water Pond, pumps and discharge line.

The stormwater pond is designed to hold a 25-year 24-hour storm event without reaching the emergency spillway.
The stormwater pond can hold a 100-year 24-hour storm event with only 0.14 cfs going over the spillway.
The pumps were sized such that the pond could be pumped down within 3 days.
The design from GeoSyntec has three 3,000 GPM pumps in parallel with a common 24" discharge line back to the discharge channel.

Please let me know if you have any comments or questions.

Thanks,

Jeremy Thompson
Engineering Design Representative
FGD Project Team
Tennessee Valley Authority
Phone: 423-751-8221
Fax: 423-751-7094

-----Original Message-----
From: NDavies@Geosyntec.com [mailto:NDavies@Geosyntec.com]

Model: VIC	Size: 20EHC	60Hz	RPM: 890	Stages: 5

Job/Inq.No. :
Purchaser : UNDEFINED
End User : Issued by : Randal Petty
Item/Equip.No. : ITEM 001 Quotation No. : RP07-08-02 01 Date : 08/02/2007
Service :
Order No. :

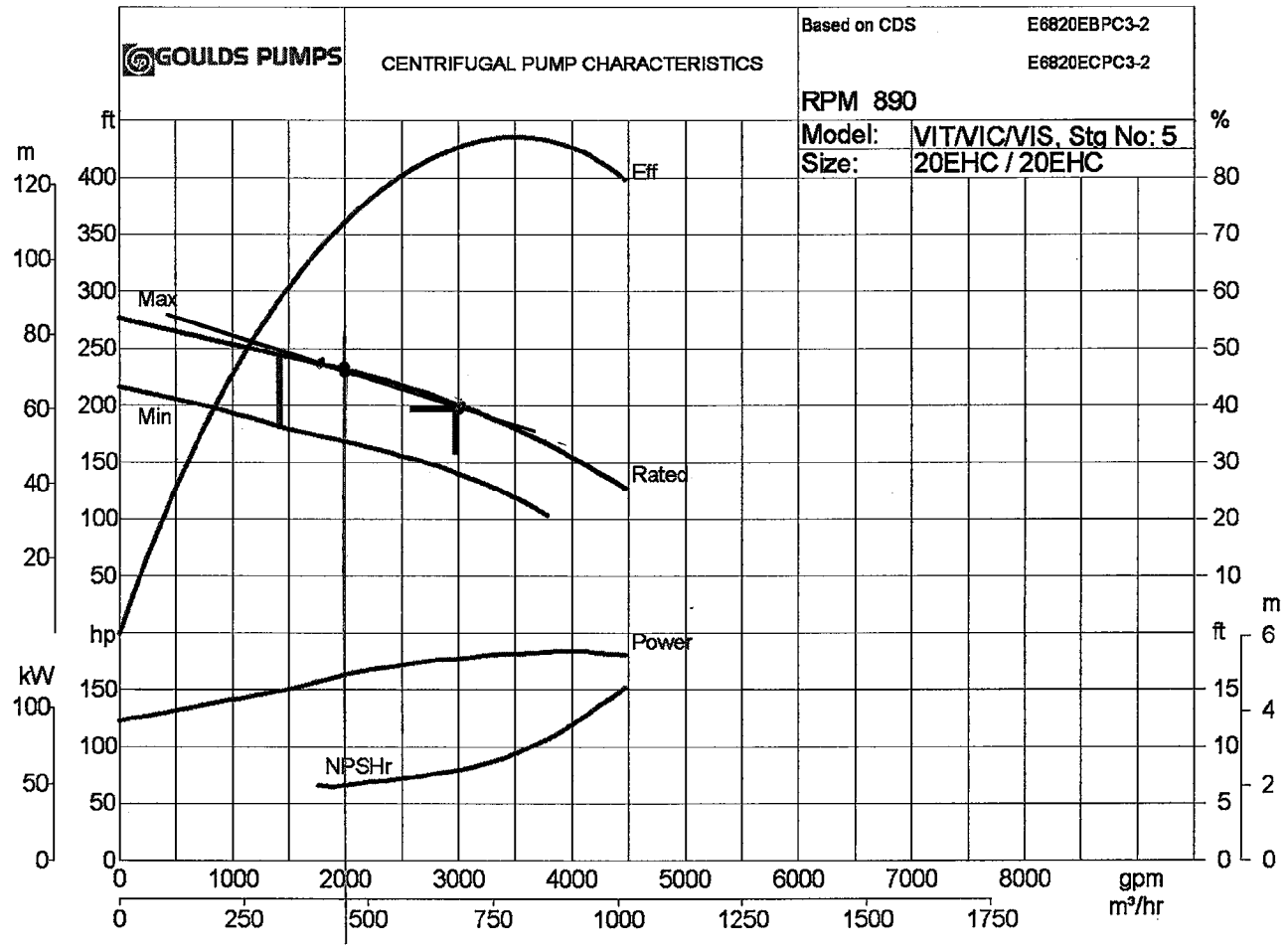
Operating Conditions

Liquid:	Water	Bowl efficiency:	86.0 %	Suction Specific Speed:	
Temp.:	70.0 deg F	Actual Pump Power:	177.3 hp	Min. Hydraulic Flow:	1,417.8 gpm
S.G./Visc.:	1.000/1.000 cp	Total Power Loss:	0.00 hp	Min. Thermal Flow:	N/A
Flow:	3,000.0 gpm	Rated Total Power:	177.3 hp		
TDH:	200.0 ft	Imp. Dia. First 1 Stg(s):	13.1875 in	Imp. Dia. Addt'l Stg(s):	13.3125 in
NPSHa:		NPSHr:	8.0 ft	Non-Overloading Power:	183.8 hp
Solid size:		Shut off Head:	276.3 ft		
% Solids:		Vapor Press:			

Max. Solids Size: 1.7500 in

Pump Performance

Notes: 1. The Mechanical seal increased drag effect on power and efficiency is not included, unless the correction is shown in the appropriate field above. 2. Magnetic drive eddy current on power and efficiency is not included. 3. Elevated temperature effects on performance are not included. 4. Non Overloading power does not reflect v-belt/gear losses.



ITT

Model: VIC	Size: 20EHC	60Hz	RPM	Stages: 5

Job/Inq.No. :
Purchaser : UNDEFINED
End User :
Item/Equip.No. : ITEM 001
Service :
Order No. :

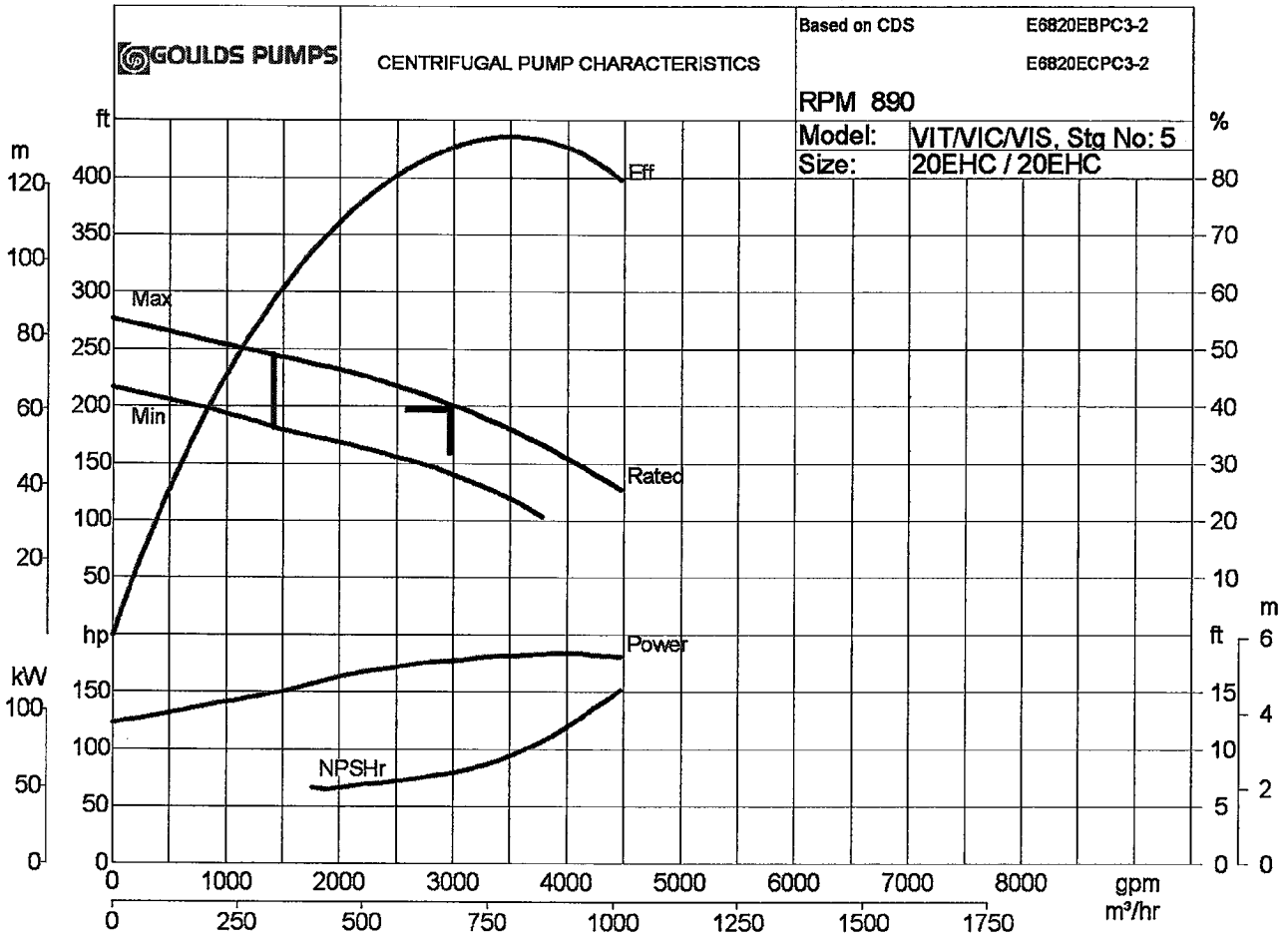
Issued by : Randal Petty
Quotation No. : RP07-08-02 01
Date : 08/02/2007

Operating Conditions

Liquid:	Water	Bowl efficiency:	86.0 %	Suction Specific Speed:	
Temp.:	70.0 deg F	Actual Pump Power:	177.3 hp	Min. Hydraulic Flow:	1,417.8 gpm
S.G./Visc.:	1.000/1.000 cp	Total Power Loss:	0.00 hp	Min. Thermal Flow:	N/A
Flow:	3,000.0 gpm	Rated Total Power:	177.3 hp		
TDH:	200.0 ft	Imp. Dia. First 1 Stg(s):	13.1875 in	Imp. Dia. Addt'l Stg(s):	13.3125 in
NPSHa:		NPSHr:	8.0 ft	Non-Overloading Power:	183.8 hp
Solid size:		Shut off Head:	276.3 ft		
% Solids:		Vapor Press:			
Max. Solids Size:	1.7500 in				

Pump Performance @ 890 RPM

Notes: 1. The Mechanical seal increased drag effect on power and efficiency is not included, unless the correction is shown in the appropriate field above. 2. Magnetic drive eddy current on power and efficiency is not included. 3. Elevated temperature effects on performance are not included. 4. Non Overloading power does not reflect v-belt/gear losses.



ITT