WPCC-3095-15

Application for
of
The Construction of Wastewater Collection and Conveyance Systems
(Phase 2)

Allen Harim Foods, LLC.
Harbeson, Delaware

November 23, 2015

JOHN HAGER REID LICENSE No. 6580 DELAWARE PROFESSIONAL ENGINEER

11/23/15

Prepared by:

Reid Engineering Company, Inc.
Environmental & Civil Engineering Consultants
540-371-8500 | www.ReidEngineering.com
1210 Princess Anne Street | Fredericksburg, VA 22401
Contact: John H. Reid, P.E. Email: jreid@reidengineering.com

The Earth is the Lord's... Reid Engineering Psalm 24:1

QUALITY | VALUE | COMMITMENT

APPLICATION FOR
THE CONSTRUCTION OF WASTEWATER COLLECTION AND CONVEYANCE SYSTEMS

ALLEN HARIM FOODS, LLC.
HARBESON, DE

TABLE OF CONTENTS

Section	Description
1	Application for the Construction of Wastewater Collection and Conveyance Systems
2	Narrative Summary of the Proposed Facilities
3	Pump/Lift Station Information **Waste Sludge Storage Tank #3 Pump Station** Pump Calculations & Pump Curve

State of Delaware
Department of Natural Resources
& Environmental Control
Division of Water

Surface Water Discharges Section
Construction Permits Branch

89 Kings Highway
Dover, Delaware 19901

Phone: (302) 739-9946
Fax: (302) 739-8369

INSTRUCTIONS FOR COMPLETING THE PERMIT APPLICATION FOR THE CONSTRUCTION OF WASTEWATER COLLECTION AND CONVEYANCE SYSTEMS

The following items must accompany the application. **Please note that incomplete application packages will be returned in their entirety and not reviewed until such time as all required information is received.**

☑ 1. A narrative summary of the intended purpose and design of the proposed facilities.

☑ 2. One (1) set of final construction plans and specifications, if applicable, signed and sealed by a Delaware-registered Professional Engineer, or a Delaware-registered Professional Land Surveyor for gravity systems only.

☑ 3. The final plans must be drawn to scale showing slopes, inverts, pipe types and sizes, existing and proposed ground surfaces, tops of manholes, water lines, stormwater and stream crossings, encasements shown in plan and profile, and other information if pertinent or requested.

☑ 4. For pump/lift stations and force mains, include all calculations and pump/performance curves.

☐ 5. A check made payable to the State of Delaware for eight hundred twenty-five dollars ($825.00), the non-refundable permit review fee. This fee covers the initial review and one follow-up review of any corrections or changes made to address the Division's comments. An additional eight hundred twenty-five dollars ($825.00) non-refundable review fee must be submitted for resubmission of the plans if changes are made to the project which trigger a complete review of the permit application.

Please submit the completed application package, as outlined above, to DE DNREC, Division of Water, SWDS, 89 Kings Highway, Dover, DE 19901. Please note, a new application, including the review fee, must be submitted if the Division's comments are not addressed or if requested supplemental information is not provided within one (1) year of the comment or request date.

The following items must be submitted prior to permit issuance:

☐ N/A 6. Verification from the appropriate county or municipal planning authority that the project has the proper zoning approval.

☐ N/A 7. A letter from the owner/operator of the wastewater facilities to which the proposed collection and conveyance facilities connect. The letter must include confirmation that the owner/operator has approved the project, that the owner/operator will take responsibility for treating and disposing of the wastewater to be conveyed and that the downstream facilities have the capacity to manage the additional flows without causing or contributing to violations of Delaware's Environmental Protection Act (7 Del. C., Chapter 60) and the regulations promulgated thereafter. This includes, but is not limited to, unauthorized discharges such as overflows at manholes and violations of the treatment system's operating permit (for example, the National Pollutant Discharge Elimination System (NPDES) permit).

Visit us on the web at: http://www.dnrec.delaware.gov/wr/Services/Pages/SurfaceWaterDischarges.aspx

Document last revised: May 14, 2013

APPLICATION FOR THE CONSTRUCTION OF WASTEWATER COLLECTION AND CONVEYANCE SYSTEMS

Application must be complete, typewritten or clearly printed

Date Application Submitted 11/24/15

PROJECT INFORMATION

Project Name and Location
Wastewater Upgrade & Expansion - Phase 2
Allen Harim Foods, LLC
Harbeson, Delaware

Tax Parcel Number(s)

County	Watershed (www.dnrec.delaware.gov/swc/wa/Pages/WatershedAssessment.aspx)
☐ Kent ☐ New Castle ☒ Sussex	☐ Chesapeake Bay ☐ DE Bay/Estuary ☒ Inland Bays/Atl Ocean ☐ Piedmont
Sewer District or Interceptor NA	Wastewater Treatment/Disposal Facility Name Allen Harim Foods, LLC - Harbeson, DE Wastewater Treatment System
Anticipated Construction Start Date April 2016	Treatment/Disposal Facility Owner and Operating Permit Number Allen Harim Foods, LLC - Harbeson, DE Wastewater Treatment System DE0000299

Please note, construction permits expire three (3) years from the date of permit issuance.

Are you requesting plan review and comment or WPCC Construction Permit issuance? (circle one)

Design Flow (gallons/day) Average	Peak	Peak Factor	Basis of Design
1,600,000	2,000,000	1.25	2,000,000

Description
The existing wastewater treatment system must be expanded to increase the treatment capacity provided by the wastewater treatment system in order to accommodate a proposed processing plant expansion. The existing wastewater treatment process must be upgraded to increase the pollutant removal efficiency attained by the wastewater treatment system in order to comply with the new more restrictive discharge permit limits.

OWNER/DEVELOPER

Company Name
Allen Harim Foods, LLC.

Mailing Address
126 North Shipley Street

City	State	Zip
Seaford	DE	19973

Contact Name
Jim Quinton – Senior Manager of Environmental and Transportation

E-Mail Address
jim.quinton@allenharimllc.com

Telephone	Cell	Fax
(410) 820-2100	302-381-8766	

ENGINEER

Company Name Reid Engineering Company, Inc.		
Mailing Address 1210 Princess Anne Street		
City Fredericksburg	State VA	Zip 22401
Contact Name John H. Reid, PE		
E-Mail Address jreid@reidengineering.com		
Telephone (540) 371-8500	Cell (540) 903-2577	Fax (540) 371-8576

GRAVITY SEWER INFORMATION

Ownership ☐ Public ☒Private	Type of Sewer System and Process Piping ☐ Residential ☐ Commercial ☒Industrial ☐ Other?			If Other, list below	
Type of Pipe Ductile Iron	Length (ft) Various	Diameter (in) 4" to 30"	Joint Specification Push on mechanical	Min. Slope (ft/ft) NA	Min. Velocity (ft/sec) NA
C900 & C905 PVC	Various	4" to 30"	Push on mechanical	NA	NA
Stainless Steel 304	Various	4" to 30"	Welded	NA	NA

Minimum Pipe Cover (ft) 2.0 ft.	Number of Manholes Precast Concrete ??	Drop manholes provided? ☐ Yes ☒No	Maximum Distance Between Manholes (ft) NA
Minimum ten foot (10') horizontal & eighteen inch (18") vertical separation from water lines maintained? ☒Yes ☐ No		If not, explain provisions to prevent cross-contamination:	

Explain any special challenges (for example, stream, highway and/or railroad crossings, directional drilling, elevated sewers, etc.)
NA

Comments
The project includes new force mains and gravity flow lines; connecting wastewater treatment process reactor tanks; process pump stations; discharge lines; and reactor tank drain lines.

ALLEN HARIM, LLC. – HARBESON, DE
NARRATIVE SUMMARY OF THE PROPOSED FACILITIES

Allen Harim is expanding their chicken processing plant in Harbeson, Delaware from the existing production capacity of 175,000 birds/day and 875,000 birds/week over 5 processing days/week up to 393,000 birds/day and 1,965,000 birds/week over 5 processing days/week. The design capacity of the existing on-site wastewater treatment system is approximately 1,250,000 gallons/day of wastewater which is highly treated prior to disposal by direct discharge. The expanded processing plant is expected to generate a maximum volume of 2,000,000 gallon/day of wastewater, 5 days/week. Consequently, the existing wastewater treatment system must be expanded to increase the treatment capacity provided by the wastewater treatment system in order to accommodate this processing plant expansion.

In order to expand the processing plant and discharge the increased volume of treated wastewater, the Allen Harim NPDES permit must be modified for the higher maximum daily design flow capacity of 2,000,000 gpd. At this higher wastewater discharge volume, the NPDES permit limits for BOD, TSS, fecal coliform and especially Total Nitrogen and Total Phosphorus will be reduced vs. the existing permit limits. Consequently, the existing wastewater treatment process must be upgraded to increase the pollutant removal efficiency attained by the wastewater treatment system in order to comply with the new more restrictive discharge permit limits.

The Allen Harim wastewater treatment system upgrade will be performed in two phases. The first phase will address the immediate need to increase the hydraulic and treatment capacity of the existing wastewater treatment system and to comply with the new permit limits except Total Nitrogen (TN). The second phase will address BNR upgrade required to comply with the new NPDES permit discharge limits for TN. Phase one will consist of items #1 through #9 as described below. **Phase two** will consist of items #10 through #16.

The wastewater treatment system upgrade and expansion project will include the installation of the following wastewater treatment system improvements:

1. Two new Raw Wastewater Pumps for the existing Raw Wastewater Pump Station to pump wastewater to the new FEB tank.

2. One new Flow Equalization Basin (FEB) for operation upstream of the existing DAF Cell wastewater pretreatment system.

3. Two new Recycle Pressurization Pumps for the existing DAF Cell.

4. Three new larger HP motors for the existing DAF Cell Effluent pumps.

5. Four new Effluent Pumps for the two existing FEB Anoxic Reactor basins #1A and #1B.

6. One new jet aeration header, jet recirculation pump and air supply blower for existing Nitrification Reactor #2A.

7. New Final Clarifier #2.

8. Modify Existing RAS/WAS Pump Station for new Final Clarifier #2 and Existing Final Clarifier #1.

9. New UV final effluent disinfection system including new concrete tank, two new UV light banks and UV controls.

10. **One new Nitrification Reactor #2B tank with diffused aeration equipment and air supply blowers.**

11. **One new Anoxic Reactor #3 tank with jet recirculation pump and jet header mixing system.**

12. **One new Aerobic Reactor #4 tank with diffused aeration equipment and air supply blowers, and with mixed liquor flow division unit for Final Clarifiers.**

13. **Retrofit existing CMAS #2 tank into one new Waste Sludge Storage Tank #3.**

14. **New traveling bridge Tertiary Sand Filters for post treatment of Final Clarifier effluent.**

15. **One new Screw Press for mechanical dewatering of excess thickened biosolids pumped from the two Sludge Storage Tanks.**

16. **One new Wastewater Equipment Building for enclosure of new blowers, pumps, Tertiary Filter, chemical equipment and operator office, bathroom and lab.**

Project scope items #1, #2 and #3 are required in order to significantly improve the pollutant removal efficiency and reliability of the existing DAF Cell wastewater pretreatment system operated upstream of the biological activated sludge final treatment system.

Project scope items #4, #5, #6, #7, and #8 are required in order to increase the treatment capacity and improve the nitrogen removal treatment efficiency of the existing activated sludge treatment reactors.

Project scope items #10, #11, #12 and #14 are required in order to upgrade the existing two stage biological nitrogen removal (BNR) system into a four stage BNR system which will provide capability to reduce final effluent total nitrogen concentration to comply with new permit TN limits.

Project scope item #9 is required to expand final effluent disinfection capacity, efficiency, redundancy and reliability to comply with new permit enterococcus limits.

Project scope item #13 and #15 are required to expand biosolids dewatering capacity.

PUMP/LIFT STATION INFORMATION

Ownership	Type of Wastewater	If Other, list below
☐ Public ☒Private	☐ Residential ☐ Commercial ☒Industrial ☐ Other?	

Pump Station Flows (gallons/day) Design	Average	Peak	Peak Factor
200 gpm	100 gpm	200 gpm	2.0

Basis of Design	Pump Type
Sludge Transfer Pumps	Submersible

Will peak flows be accommodated if largest unit fails?	Pump calc's and pump curves attached?	Cycle Time (minutes)	Wet Well Detention Time (minutes)
xYes ☐ No	xYes ☐ No	NA	NA

Check valves provided on discharge line?	Gate valves provided on discharge line?
xYes ☐ No	xYes ☐ No

If not, explain alternate procedure:

Ventilation provided in wet well?	Dry Well?	Is an alarm system included?	Alternate source of power?
☐ Yes ☐ No NA	☐ Yes ☒No	xYes ☐ No	☐ Yes ☒No

What other provisions for emergency operations?

Height of Influent Above Pump (suction head) (ft)	Height of Effluent Above Pump (discharge head) (ft)	Friction Loss (ft)
		25.4

Pump Design Point	Pump Operating Point	Static Head (ft)	Total Head (ft)	Required Motor Horsepower (hp)
200 gpm	200 gpm at 35 feet TDH	8 feet	33.4 feet	10

FORCE MAIN INFORMATION

Type of Pipe	Length (ft)	Diameter (in)
DIP and C900 PVC	≈ 430 feet	4 inch

Hazen-Williams "C" Design Factor	Type of Joints	Velocity Under Design Conditions (ft/sec)	Minimum Pipe Cover (ft)
110 and 120	Push On	5.1 feet/sec	2.0

Air relief valves specified?	Clean-outs provided?	Maximum distance between clean-outs (ft)
☐ Yes ☒ No	☐ Yes ☒ No	NA

Minimum ten foot (10') horizontal & eighteen inch (18") vertical separation from water lines maintained?	If not, explain provisions to prevent cross-contamination:
xYes ☐ No	

Comments

The Waste Sludge Storage Tank (WSST) #3 submersible pumps will be used by the operator to transfer sludge from WSST #3 to WSST #1 or #2. Operations staff will determine time, duration and speed to operate the pumps.

PROJECT: Allen Harim
SUBJECT: WSST #3 Pump Station to Ex. WSSTs
DATE: 24-Nov-2015
PUMP: **CONDITION:** 1 **Pump On**

Design Flow = 200 GPM
Flow Calculation Increment = 25 GPM
Miscellaneous Losses = 0 Feet

WSST HWL

Static Lift = **8.0 Feet**

DESCRIPTION	Discharge #1				Diameter =		4 Inches	Length =		15 Equivalent Length =			56.6 Total Length =			71.6
							Flow Multiplier 1									
Flow (gpm)	50	75	100	125	150	175	**200**	225	250	275	300	325	350	375	400	
Flow (cfs)	0.11	0.17	0.22	0.28	0.33	0.39	**0.45**	0.50	0.56	0.61	0.67	0.72	0.78	0.84	0.89	
Diam. (in) =	4	4	4	4	4	4	**4**	4	4	4	4	4	4	4	4	
Diam. (ft) =	0.33	0.33	0.33	0.33	0.33	0.33	**0.33**	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	
Total Length (ft) =	71.6	71.6	71.6	71.6	71.6	71.6	**71.6**	71.6	71.6	71.6	71.6	71.6	71.6	71.6	71.6	
Wetted Perimeter (ft)	1.05	1.05	1.05	1.05	1.05	1.05	**1.05**	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	
Pipe Area (sf)	0.09	0.09	0.09	0.09	0.09	0.09	**0.09**	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	
R_H	0.08	0.08	0.08	0.08	0.08	0.08	**0.08**	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	
C =	120	120	120	120	120	120	**120**	120	120	120	120	120	120	120	120	
Vel. (fps)	1.3	1.9	2.6	3.2	3.8	4.5	**5.1**	5.7	6.4	7.0	7.7	8.3	8.9	9.6	10.2	
Friction Loss (ft)	0.18	0.37	0.63	0.96	1.34	1.79	**2.29**	2.84	3.46	4.12	4.84	5.61	6.44	7.32	8.24	
Entrance Loss (ft)	0.01	0.03	0.05	0.08	0.11	0.16	**0.20**	0.26	0.32	0.38	0.46	0.53	0.62	0.71	0.81	
Headloss (ft)	0.19	0.40	0.69	1.04	1.46	1.94	**2.49**	3.10	3.77	4.50	5.30	6.15	7.06	8.03	9.05	

DESCRIPTION	Discharge #2				Diameter =		4 Inches	Length =		25 Equivalent Length =			50 Total Length =			75
							Flow Multiplier 1									
Flow (gpm)	50	75	100	125	150	175	**200**	225	250	275	300	325	350	375	400	
Flow (cfs)	0.11	0.17	0.22	0.28	0.33	0.39	**0.45**	0.50	0.56	0.61	0.67	0.72	0.78	0.84	0.89	
Diam. (in) =	4	4	4	4	4	4	**4**	4	4	4	4	4	4	4	4	
Diam. (ft) =	0.33	0.33	0.33	0.33	0.33	0.33	**0.33**	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	
Total Length (ft) =	75.0	75.0	75.0	75.0	75.0	75.0	**75.0**	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	
Wetted Perimeter (ft)	1.05	1.05	1.05	1.05	1.05	1.05	**1.05**	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	
Pipe Area (sf)	0.09	0.09	0.09	0.09	0.09	0.09	**0.09**	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	
R_H	0.08	0.08	0.08	0.08	0.08	0.08	**0.08**	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	
C =	120	120	120	120	120	120	**120**	120	120	120	120	120	120	120	120	
Vel. (fps)	1.3	1.9	2.6	3.2	3.8	4.5	**5.1**	5.7	6.4	7.0	7.7	8.3	8.9	9.6	10.2	
Friction Loss (ft)	0.18	0.39	0.66	1.00	1.41	1.87	**2.40**	2.98	3.62	4.32	5.07	5.88	6.75	7.66	8.64	
Headloss (ft)	0.18	0.39	0.66	1.00	1.41	1.87	**2.40**	2.98	3.62	4.32	5.07	5.88	6.75	7.66	8.64	

DESCRIPTION	Force Main #1				Diameter =		4 Inches	Length =		100 Equivalent Length =			53.2 Total Length =			153.2
							Flow Multiplier 1									
Flow (gpm)	50	75	100	125	150	175	**200**	225	250	275	300	325	350	375	400	
Flow (cfs)	0.11	0.17	0.22	0.28	0.33	0.39	**0.45**	0.50	0.56	0.61	0.67	0.72	0.78	0.84	0.89	
Diam. (in) =	4	4	4	4	4	4	**4**	4	4	4	4	4	4	4	4	
Diam. (ft) =	0.33	0.33	0.33	0.33	0.33	0.33	**0.33**	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	
Total Length (ft) =	153.2	153.2	153.2	153.2	153.2	153.2	**153.2**	153.2	153.2	153.2	153.2	153.2	153.2	153.2	153.2	
Wetted Perimeter (ft)	1.05	1.05	1.05	1.05	1.05	1.05	**1.05**	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	
Pipe Area (sf)	0.09	0.09	0.09	0.09	0.09	0.09	**0.09**	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	
R_H	0.08	0.08	0.08	0.08	0.08	0.08	**0.08**	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	
C =	120	120	120	120	120	120	**120**	120	120	120	120	120	120	120	120	
Vel. (fps)	1.3	1.9	2.6	3.2	3.8	4.5	**5.1**	5.7	6.4	7.0	7.7	8.3	8.9	9.6	10.2	
Friction Loss (ft)	0.38	0.80	1.36	2.05	2.87	3.82	**4.89**	6.08	7.39	8.82	10.36	12.01	13.78	15.66	17.64	
Headloss (ft)	0.38	0.80	1.36	2.05	2.87	3.82	**4.89**	6.08	7.39	8.82	10.36	12.01	13.78	15.66	17.64	

DESCRIPTION	Force Main #2				Diameter =		4 Inches	Length =		290 Equivalent Length =			116.7 Total Length =			406.7
							Flow Multiplier 1									
Flow (gpm)	50	75	100	125	150	175	**200**	225	250	275	300	325	350	375	400	
Flow (cfs)	0.11	0.17	0.22	0.28	0.33	0.39	**0.45**	0.50	0.56	0.61	0.67	0.72	0.78	0.84	0.89	
Diam. (in) =	4	4	4	4	4	4	**4**	4	4	4	4	4	4	4	4	
Diam. (ft) =	0.33	0.33	0.33	0.33	0.33	0.33	**0.33**	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	
Total Length (ft) =	406.7	406.7	406.7	406.7	406.7	406.7	**406.7**	406.7	406.7	406.7	406.7	406.7	406.7	406.7	406.7	
Wetted Perimeter (ft)	1.05	1.05	1.05	1.05	1.05	1.05	**1.05**	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	
Pipe Area (sf)	0.09	0.09	0.09	0.09	0.09	0.09	**0.09**	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	
R_H	0.08	0.08	0.08	0.08	0.08	0.08	**0.08**	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	
C =	110	110	110	110	110	110	**110**	110	110	110	110	110	110	110	110	
Vel. (fps)	1.3	1.9	2.6	3.2	3.8	4.5	**5.1**	5.7	6.4	7.0	7.7	8.3	8.9	9.6	10.2	
Friction Loss (ft)	1.17	2.49	4.23	6.40	8.96	11.92	**15.26**	18.97	23.06	27.50	32.31	37.46	42.97	48.82	55.01	
Exit Loss (ft)	0.03	0.06	0.10	0.16	0.23	0.31	**0.40**	0.51	0.63	0.77	0.91	1.07	1.24	1.42	1.62	
Headloss (ft)	1.20	2.54	4.33	6.55	9.19	12.23	**15.66**	19.49	23.69	28.27	33.22	38.53	44.21	50.24	56.63	

Static Head (ft)	8.0	8.0	8.0	8.0	8.0	8.0	**8.0**	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	
Friction Loss (ft)	1.9	4.1	7.0	10.6	14.9	19.9	**25.4**	31.7	38.5	45.9	53.9	62.6	71.8	81.6	92.0	
TDH (ft)	9.9	12.1	15.0	18.6	22.9	27.9	**33.4**	39.7	46.5	53.9	61.9	70.6	79.8	89.6	100.0	

WSST #3 Transfer Sludge Pumps

FLYGT

PERFORMANCE CURVE

PRODUCT	TYPE
NP3102.185	MT

DATE	PROJECT	CURVE NO	ISSUE
2010-08-02	FLYGT US Catalog	63-463-00-3703	2

	1/1-LOAD	3/4-LOAD	1/2-LOAD
POWER FACTOR	0.81	0.75	0.63
EFFICIENCY	85.0 %	85.0 %	83.5 %
MOTOR DATA	---	---	---

RATED POWER	5	hp
STARTING CURRENT ...	42	A
RATED CURRENT ...	6.8	A
RATED SPEED	1745	rpm
TOT.MOM.OF INERTIA ...	0.027	kgm2
NO. OF BLADES	2	

IMPELLER DIAMETER: 172 mm

MOTOR #	STATOR	REV
18-11-4AL	1 YSER	11

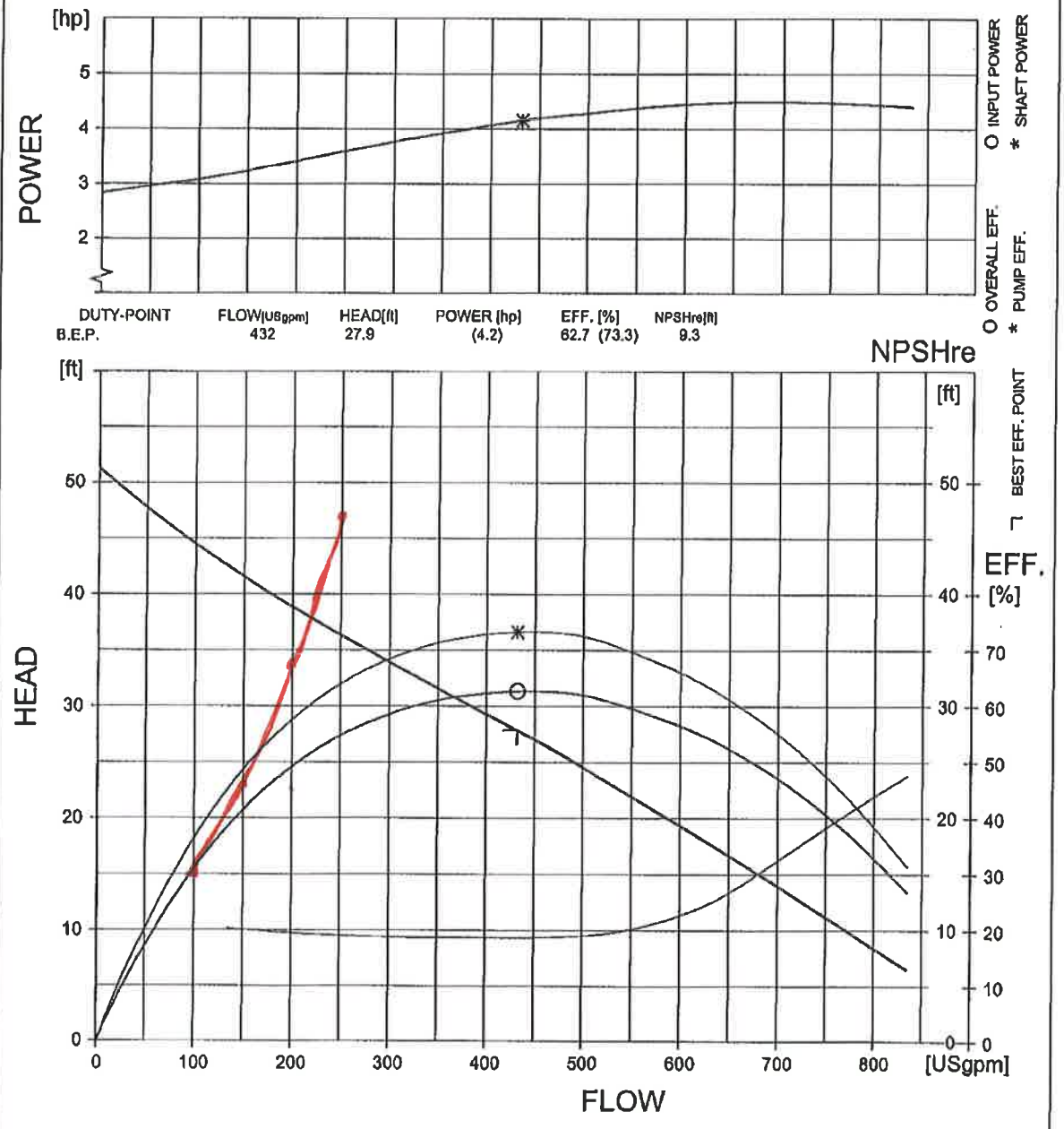
FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	460 V	4

GEARTYPE: --- RATIO: ---

COMMENTS: NEMA Code Letter: A

INLET/OUTLET: -/ 4 inch

IMP. THROUGHLET: ---



FLYPS 3.1.6.3 (20060531)

NPSHre = NPSH3% + min. operational margin

Performance with clear water and ambient temp 40 °C

FLYGT CURVE