

Grundfos Technical Institute



How to Read a Pump Curve
Jim Swetye
January 28, 2016

www.grundfos.us/training

WELCOME



- Participants are in a listen-only mode.
- To ask a question during the event, use the chat feature at the bottom left of your screen. Technical questions will be answered by ReadyTalk. Questions for our speakers can be asked at any time and will be answered during the Q&A at the end of the session.
- Visit pumpsandsystems.com in the coming days to view the answers to all of the questions asked during the Q&A session.
- Visit pumpsandsystems.com in the coming days to access the recording of the webinar.

Presenter: Jim Sweyte

Jim Swetye is Senior Technical Trainer with Grundfos Pumps Corporation in Ohio

He holds a Bachelor of Arts from Hiram College, Ohio and a Master of Science in Education/Curriculum Leadership from Emporia State University, Kansas

He has been in the industry for 37 years

Jim specializes in pumping systems for commercial HVAC, residential hydronics, industrial and municipal applications.

He is the former Vice President of Knowledge and Education at the Hydraulic Institute, is a certified trainer for Pump Systems Matter, and is a current co-chairman of the Educational Marketing Executive Committee of Pump Systems Matter



Learning Objectives

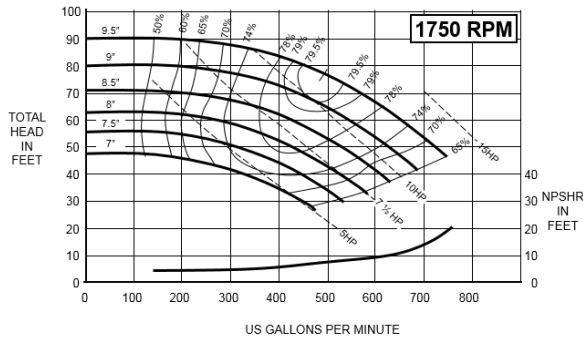


By the end of this course you will be able to:

1. Read the pump curve – Know what information is there and how it is formatted
2. Interpret the pump curve – Explain what the information means
3. Use the pump curve – Make decisions on choice of pump, motor sizing, power consumption strategies, and others

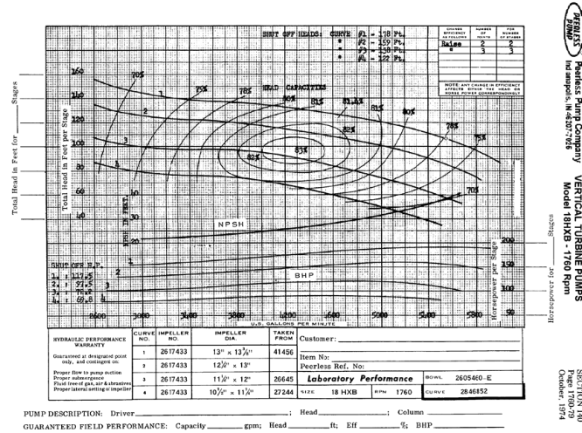
Traditional Curve Formats

Typical Single Stage Pump Curve



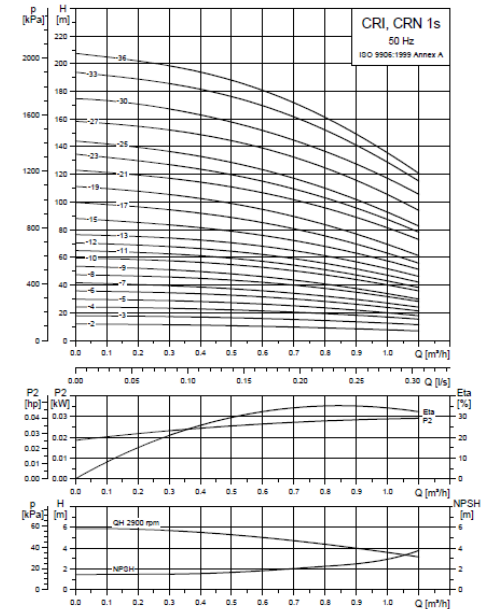
A

Typical Single Stage Curve for Multistage Turbine Pump



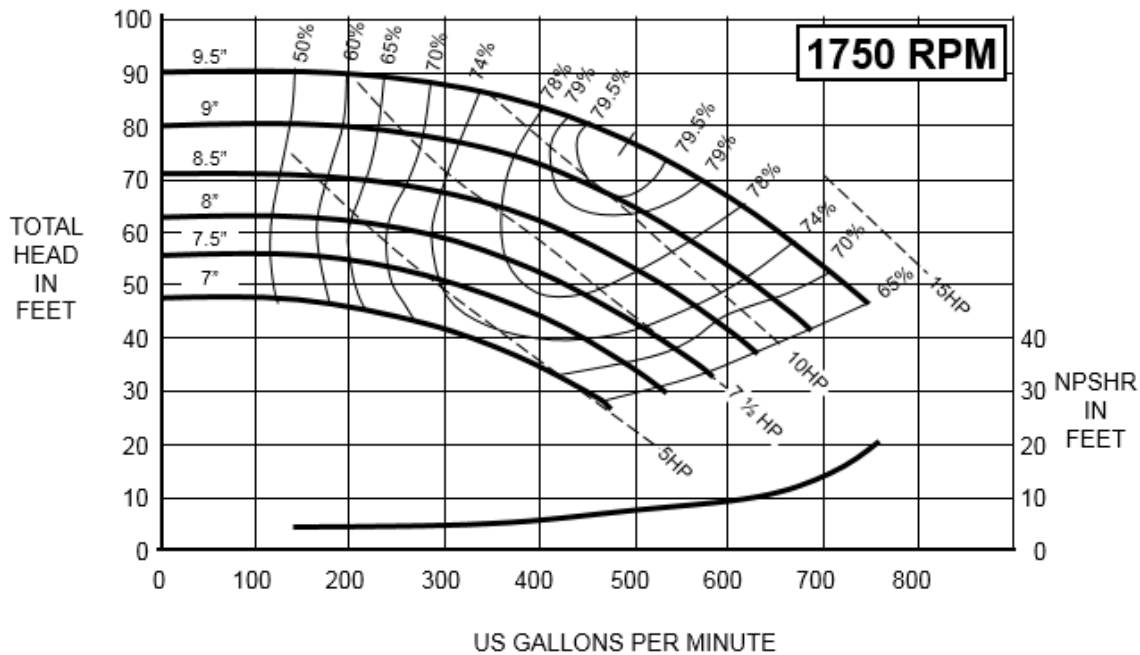
B

Typical Vertical Inline Multistage Pump Curve

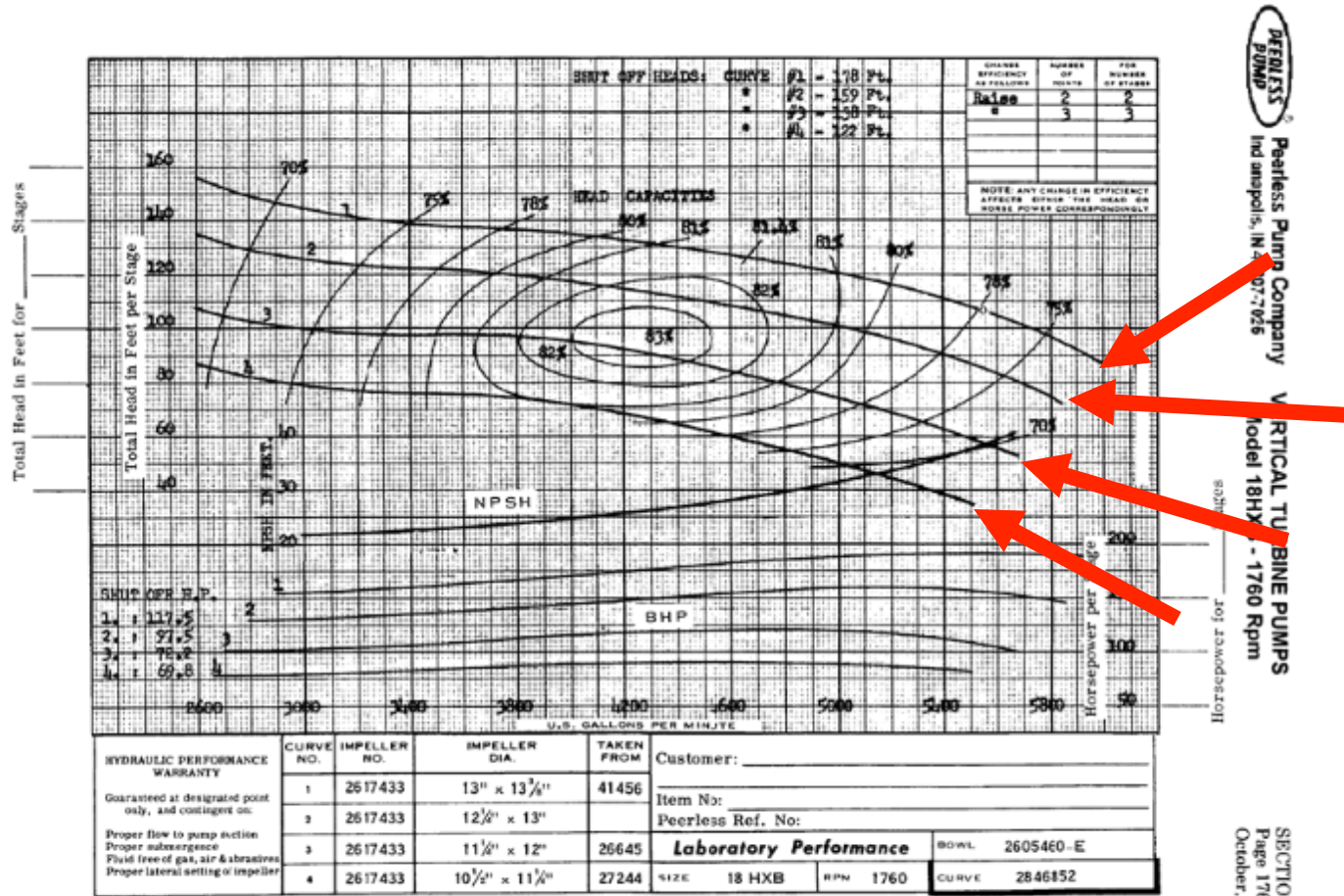


C

A: Typical Single Stage Pump Curve



B: Typical Single Stage Curve for Multistage Turbine Pump



PUMP DESCRIPTION: Driver _____; Head _____; Column _____
 GUARANTEED FIELD PERFORMANCE: Capacity _____ gpm; Head _____ ft; Eff _____ %; BHP _____

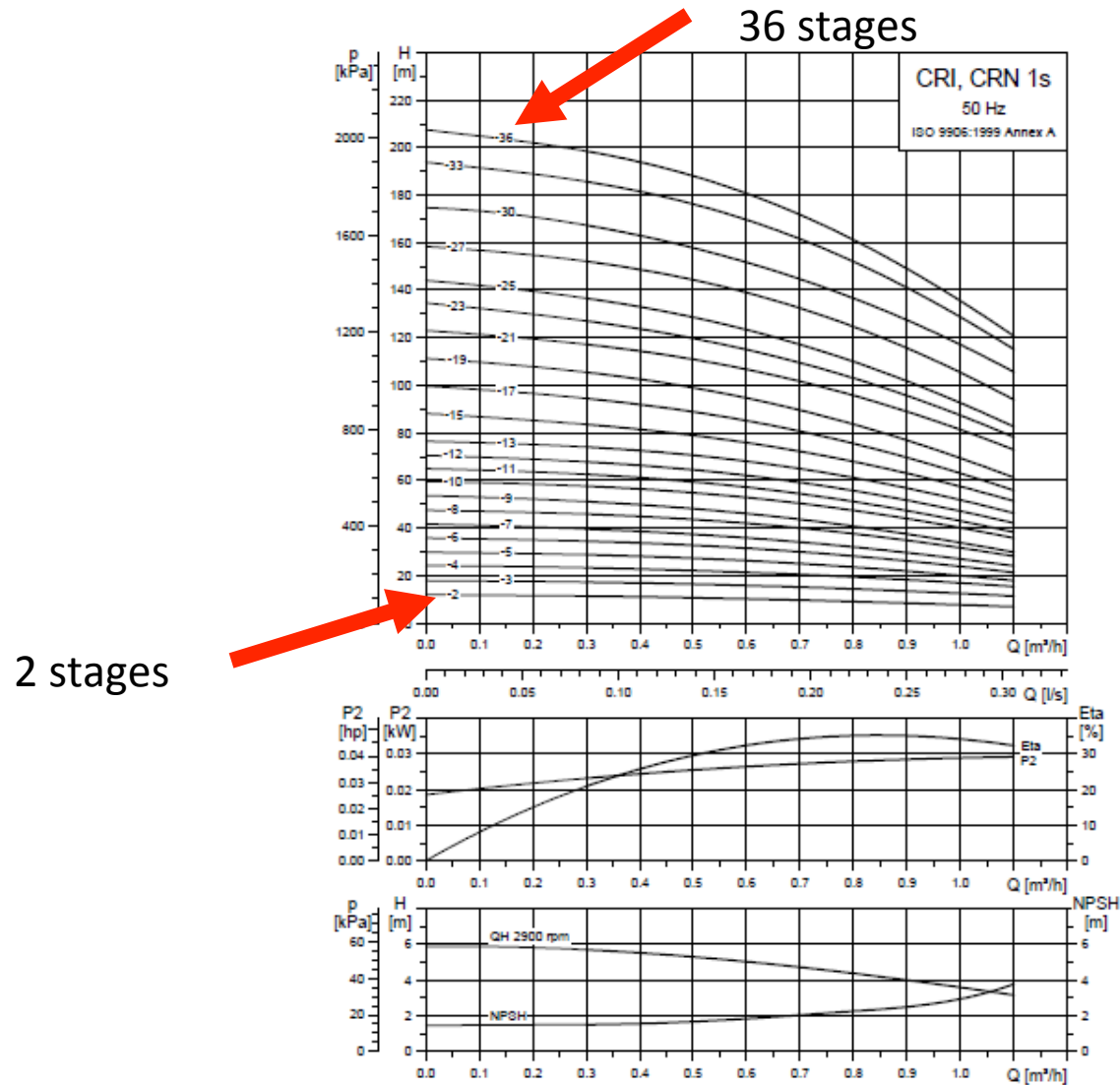


Peerless Pump Company
 Indianapolis, IN 46077-0056

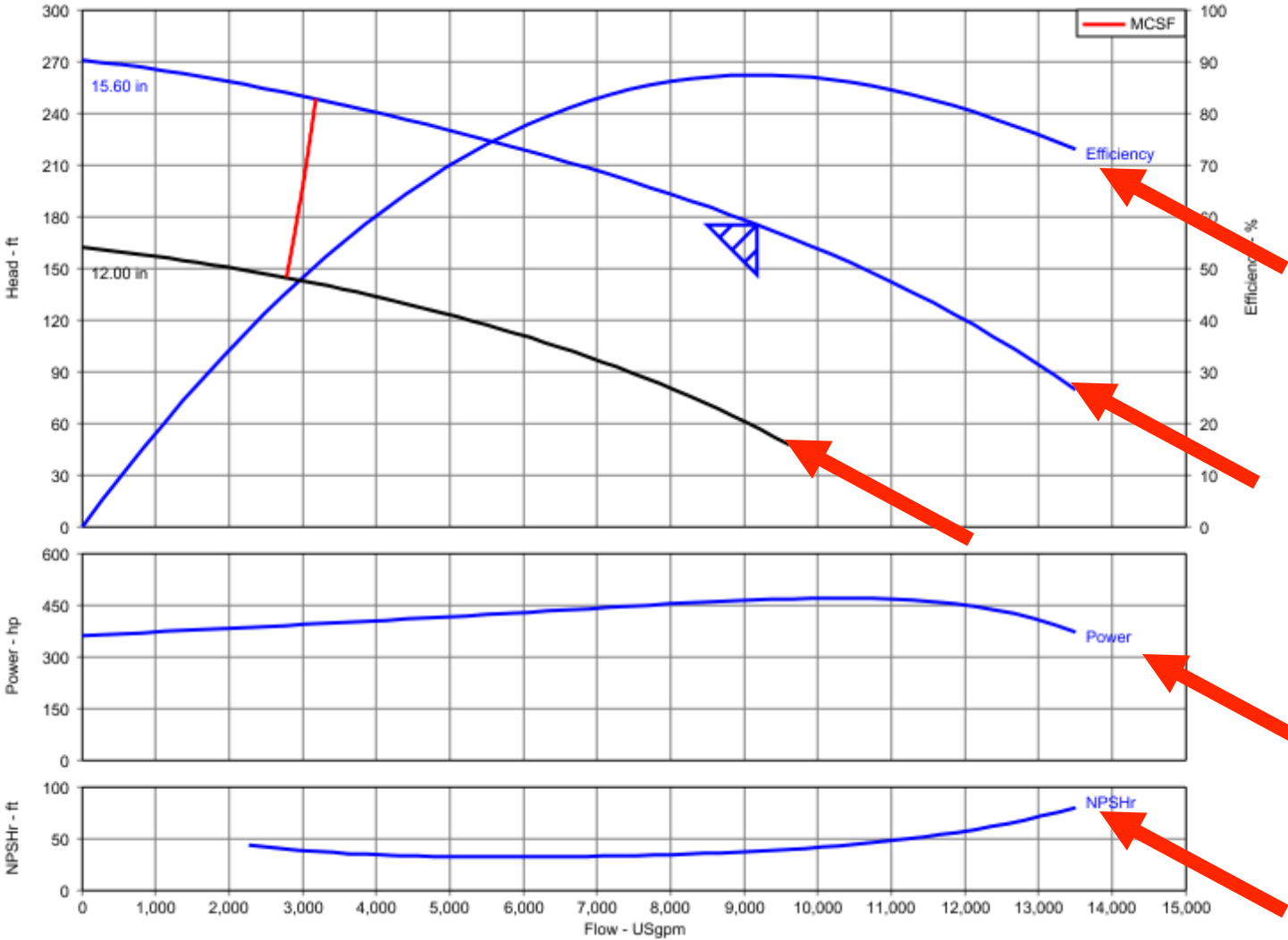
VERTICAL TURBINE PUMPS
 Model 18HX - 1760 Rpm

SECTION 140
 Page 1760-79
 October, 1974

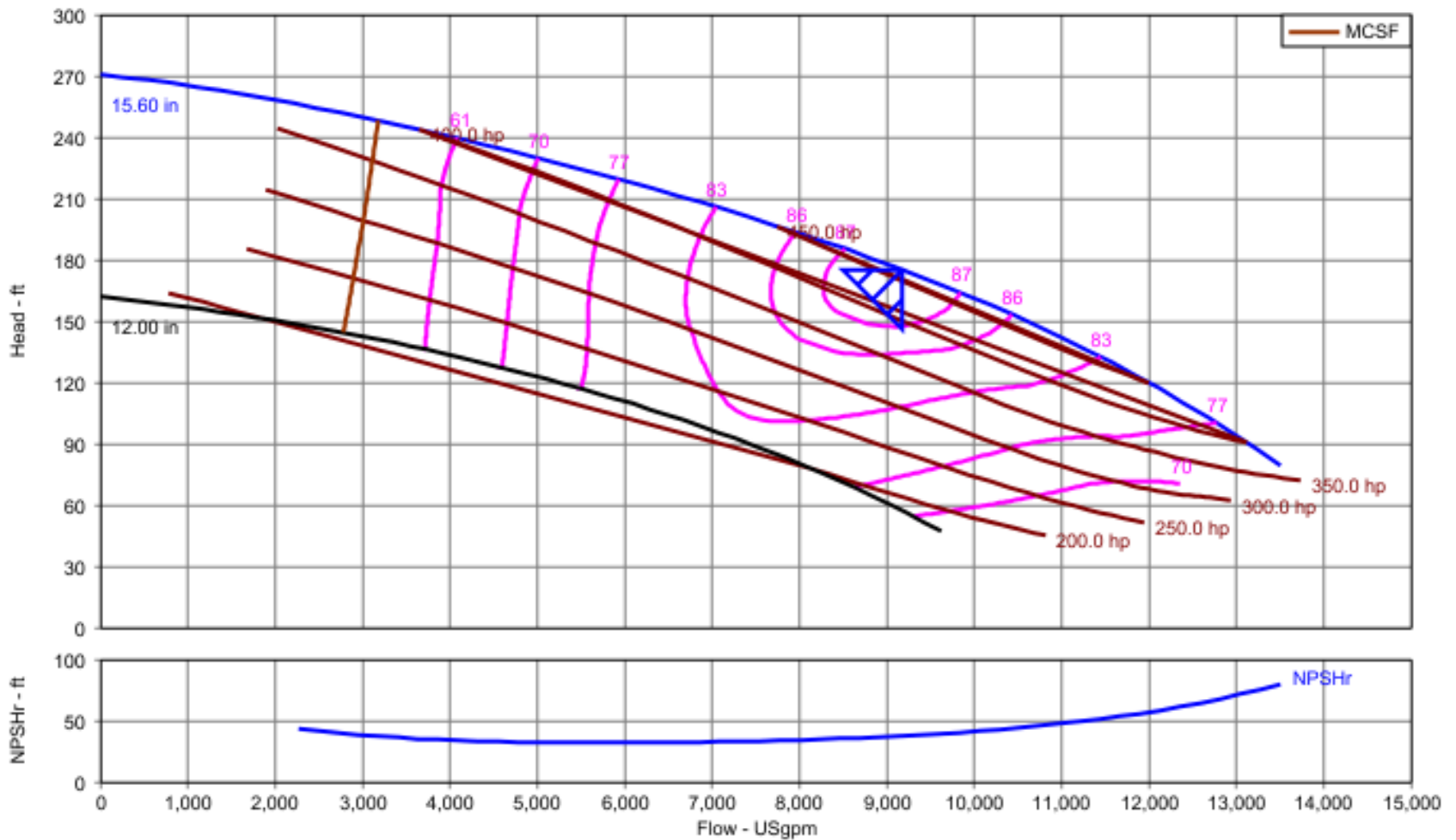
C: Typical Vertical Inline Multistage Pump Curve



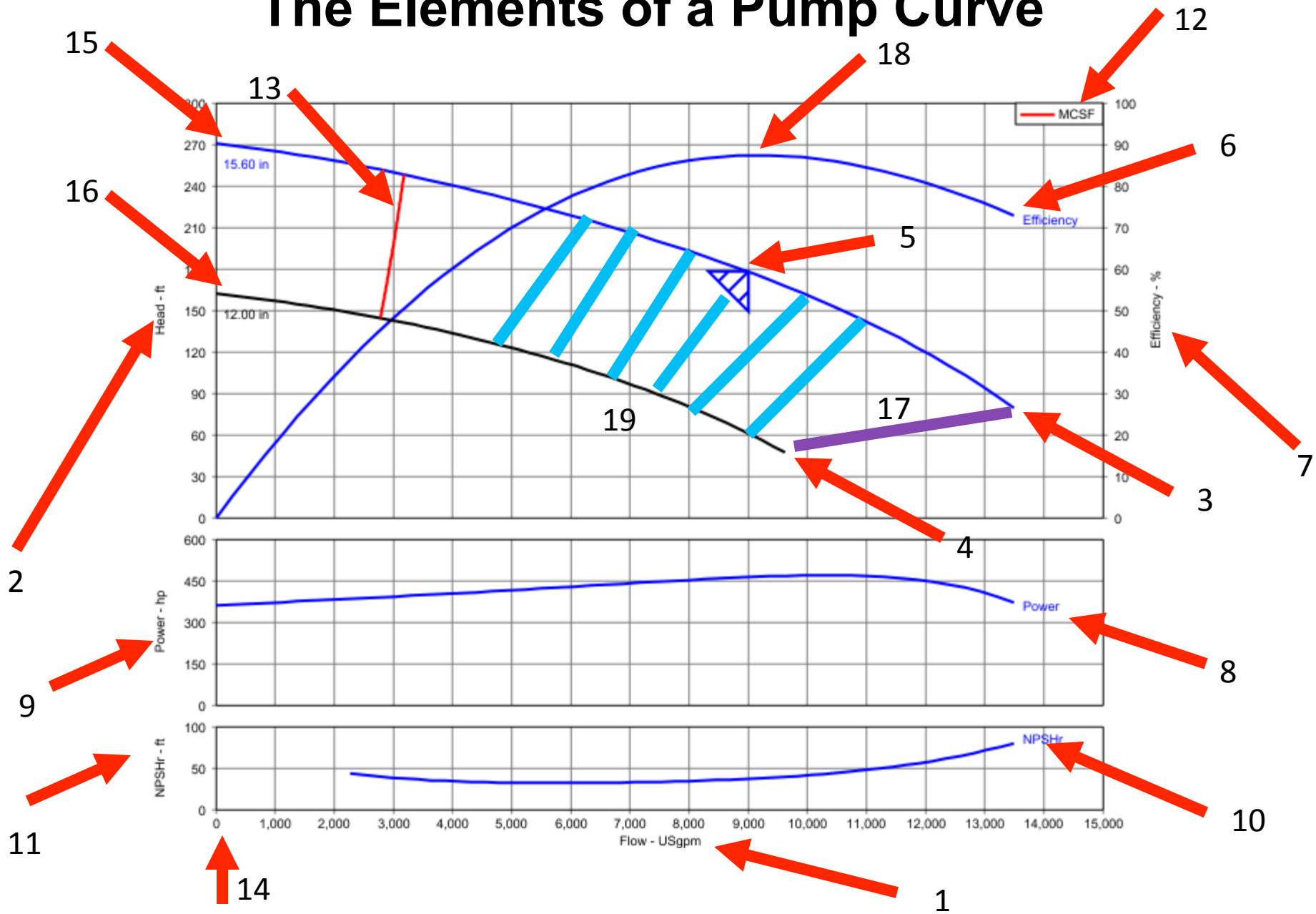
Pump Performance Curve from Modern Software



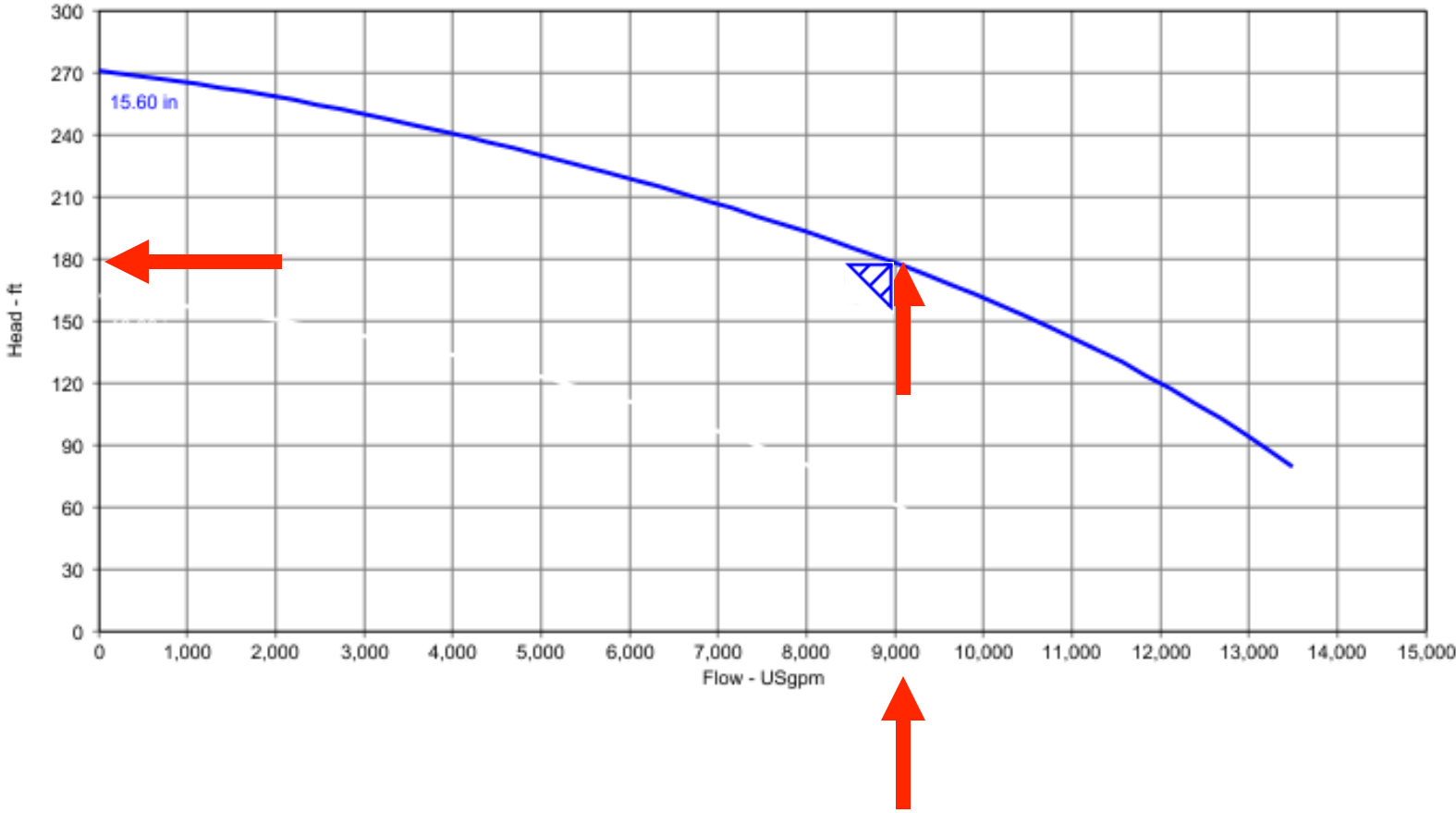
Use of ISO Lines



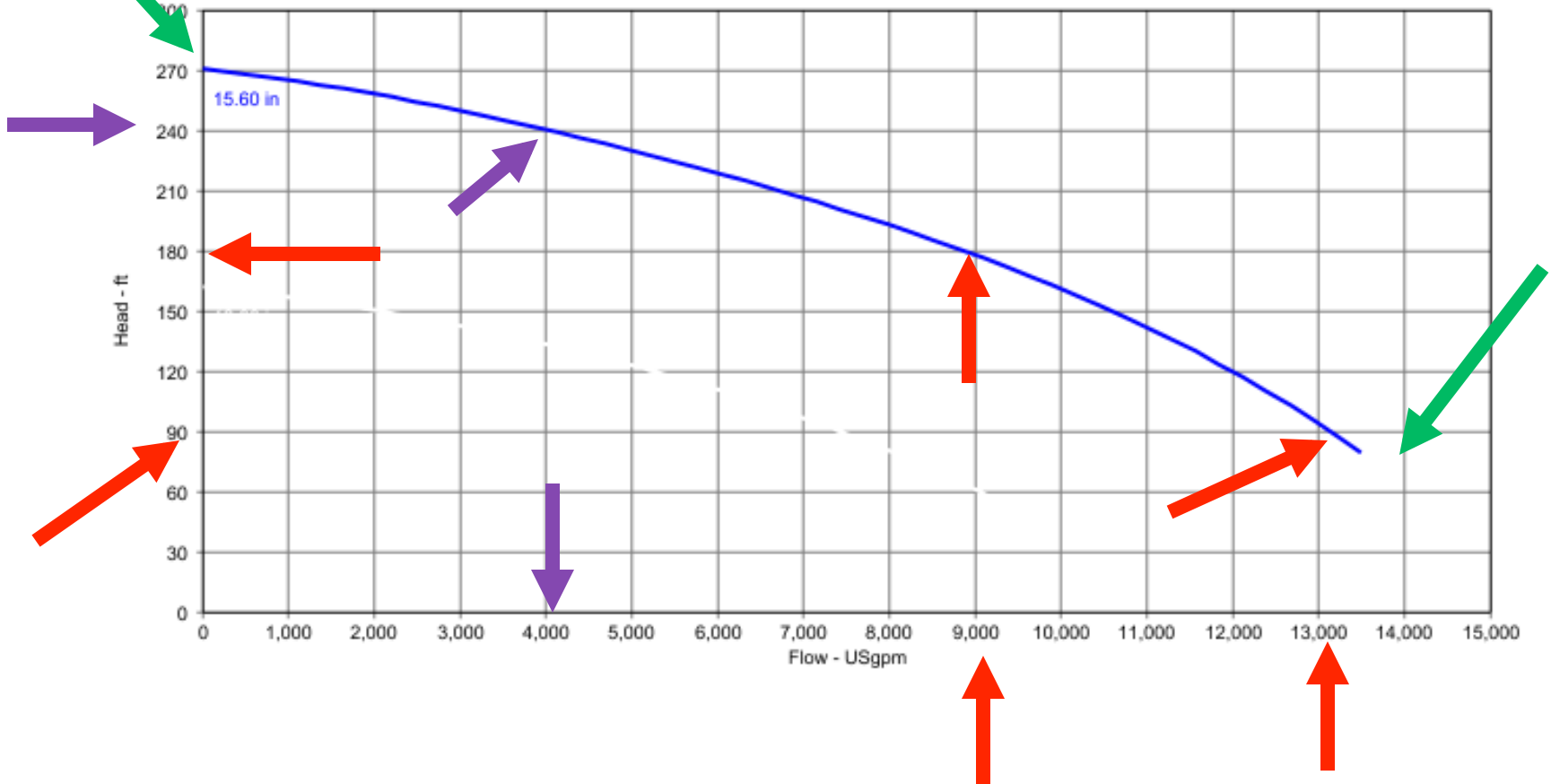
The Elements of a Pump Curve



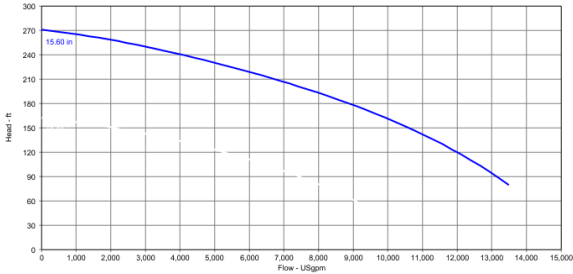
Relationship of Flow to Head



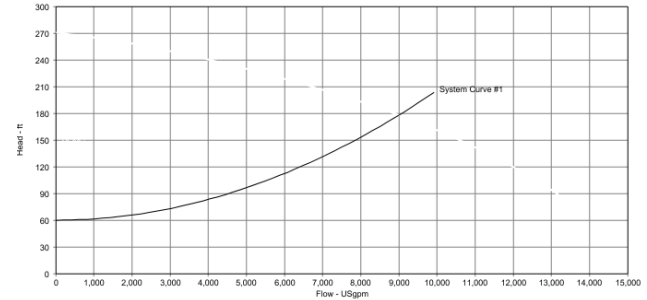
What if the actual head changes?



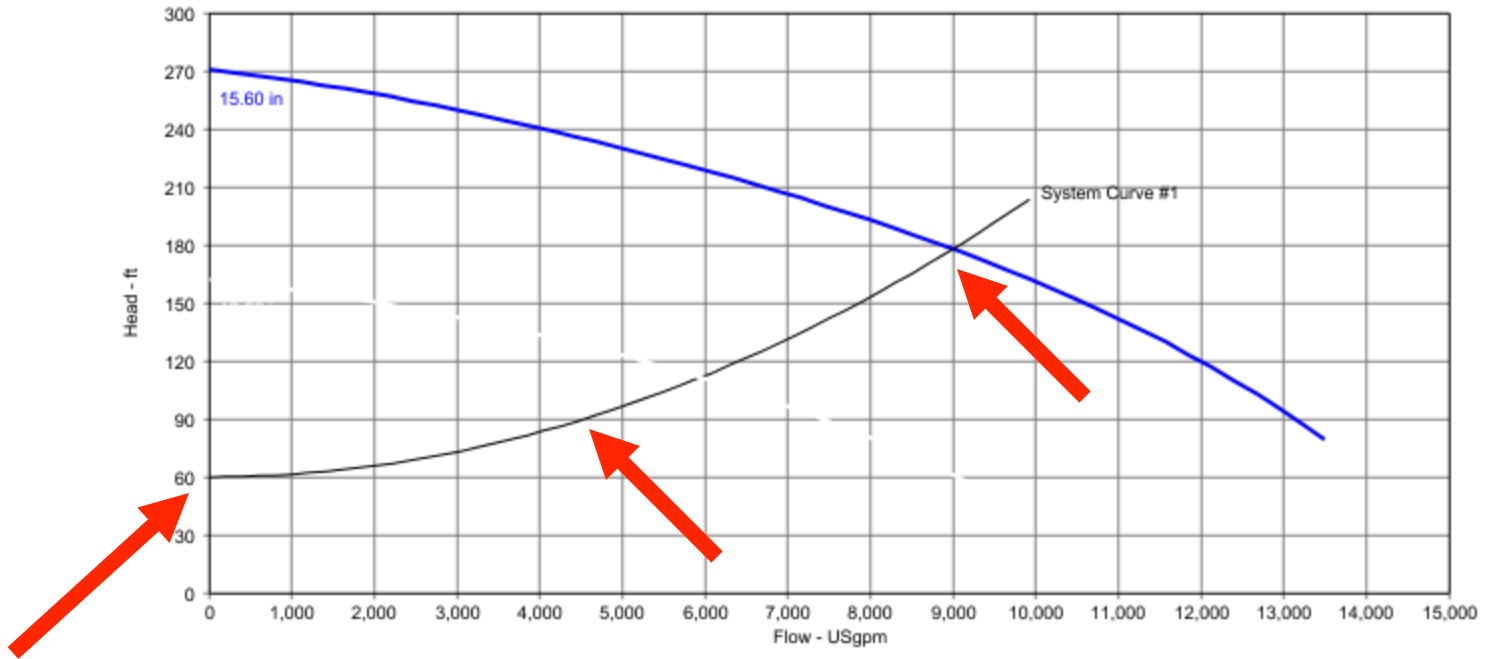
Using the System Head Curve



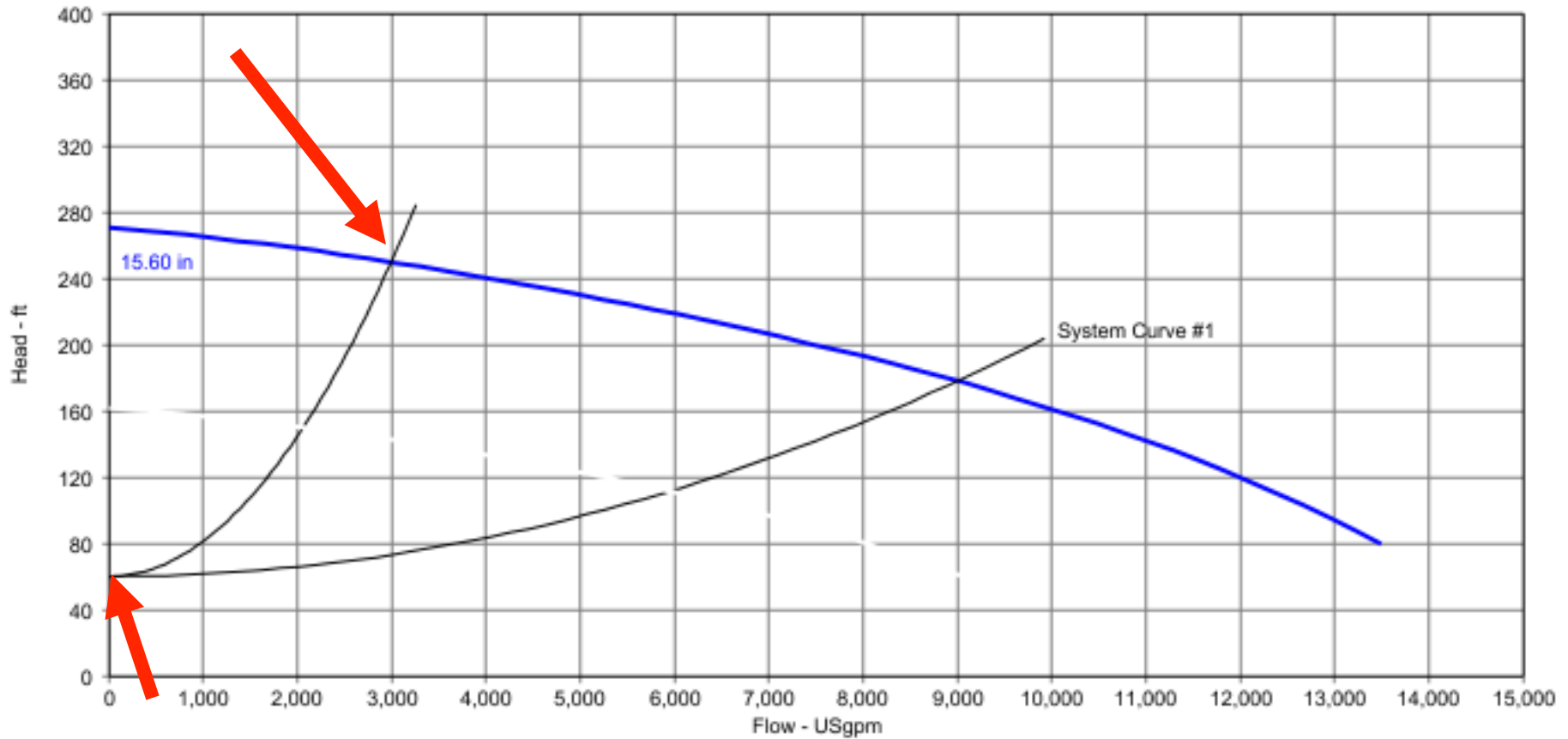
Pump curve from previous slide



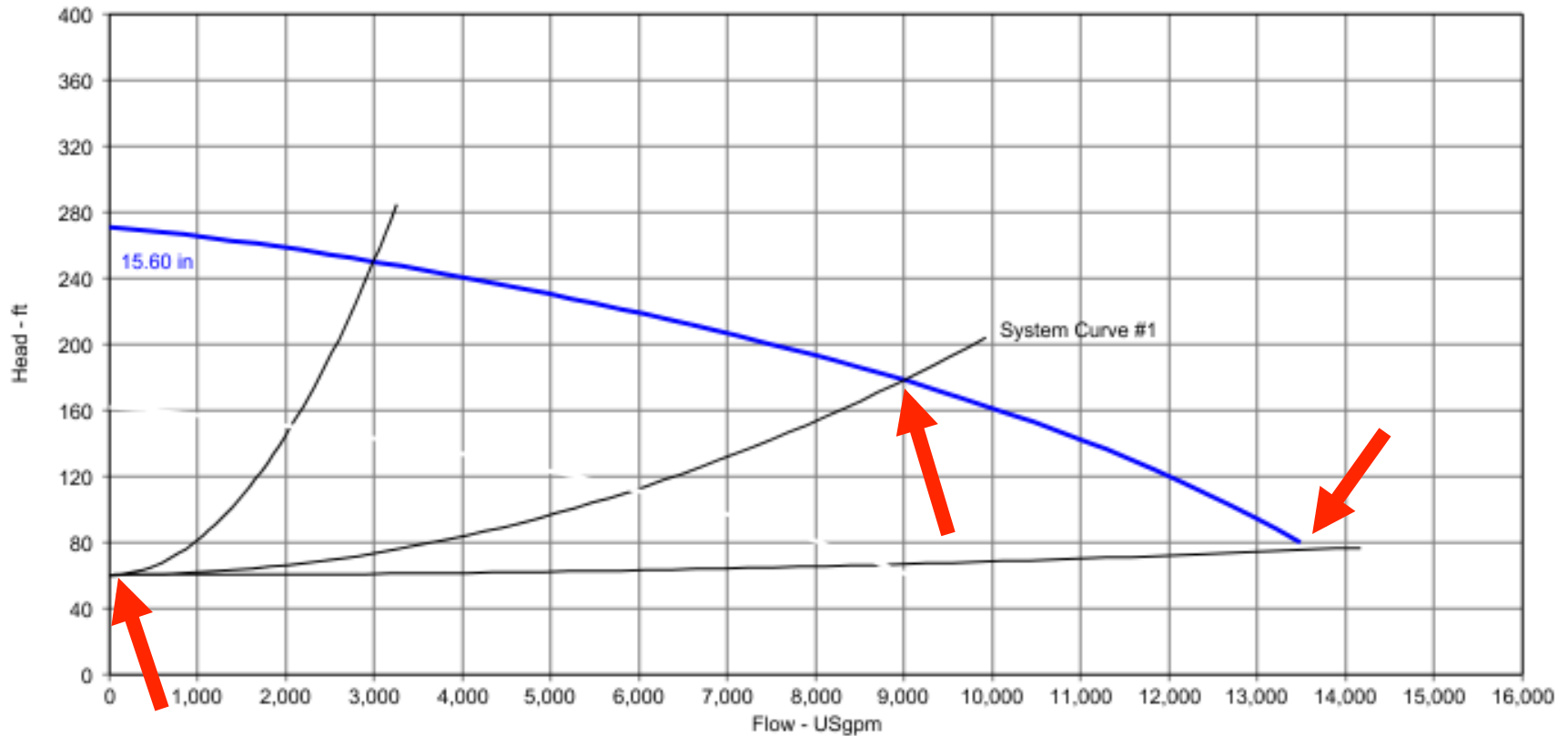
System curve



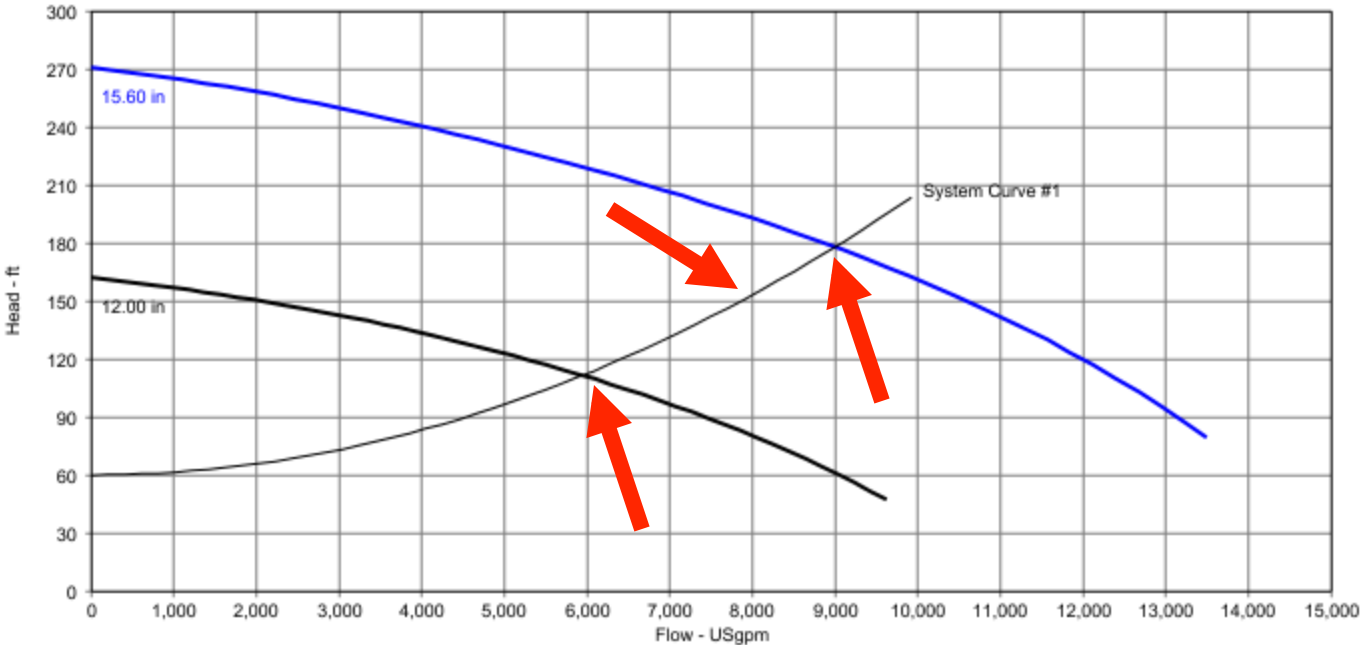
What if someone closes a valve?



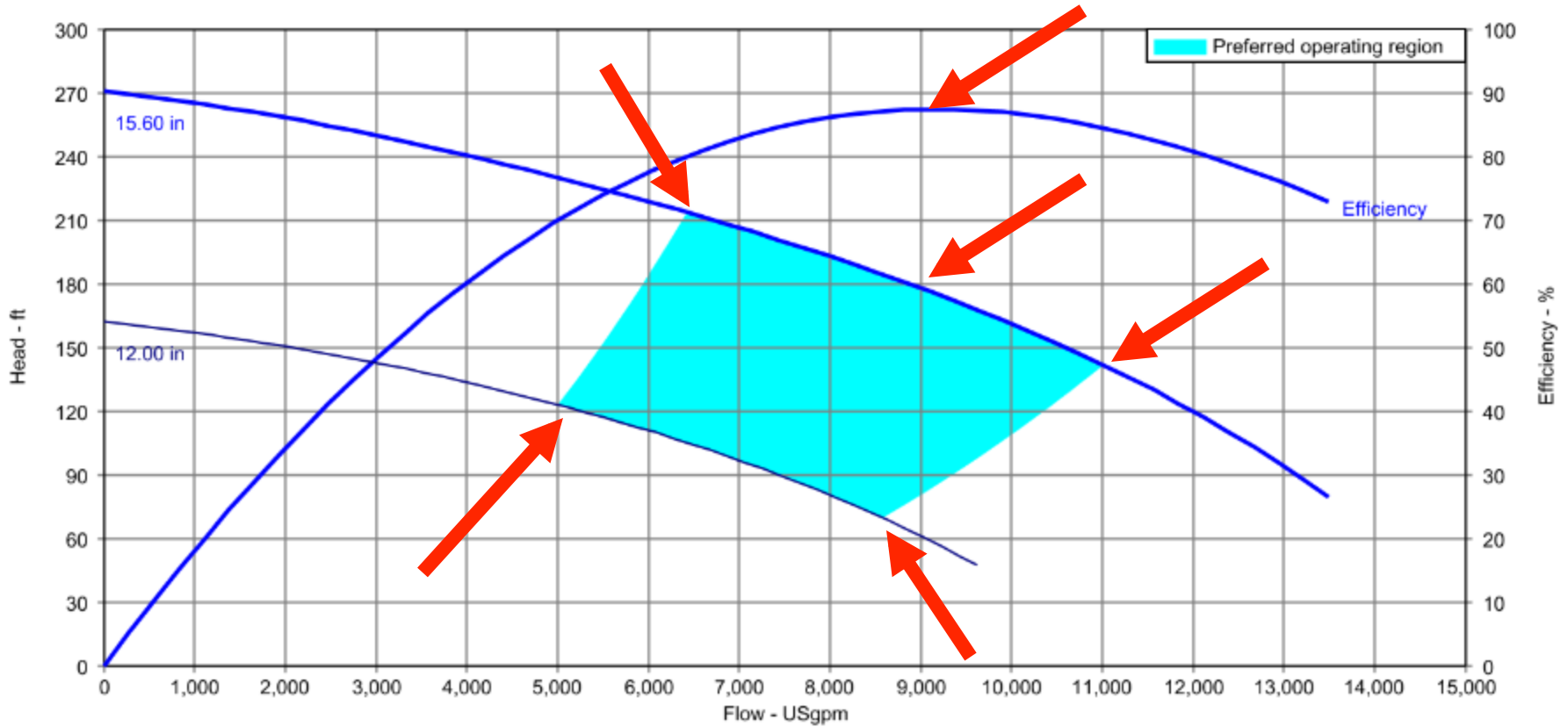
What if actual head is lower than calculated?



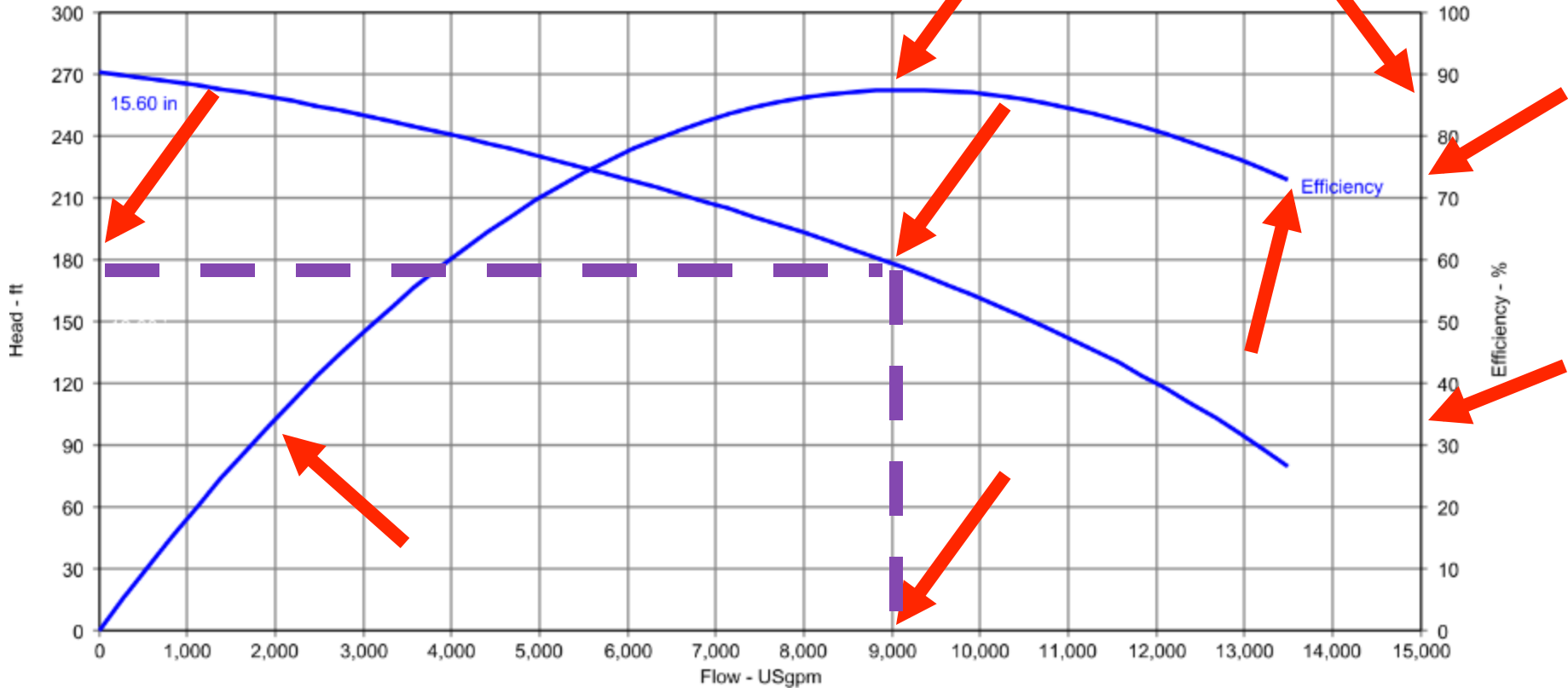
Reducing the impeller diameter



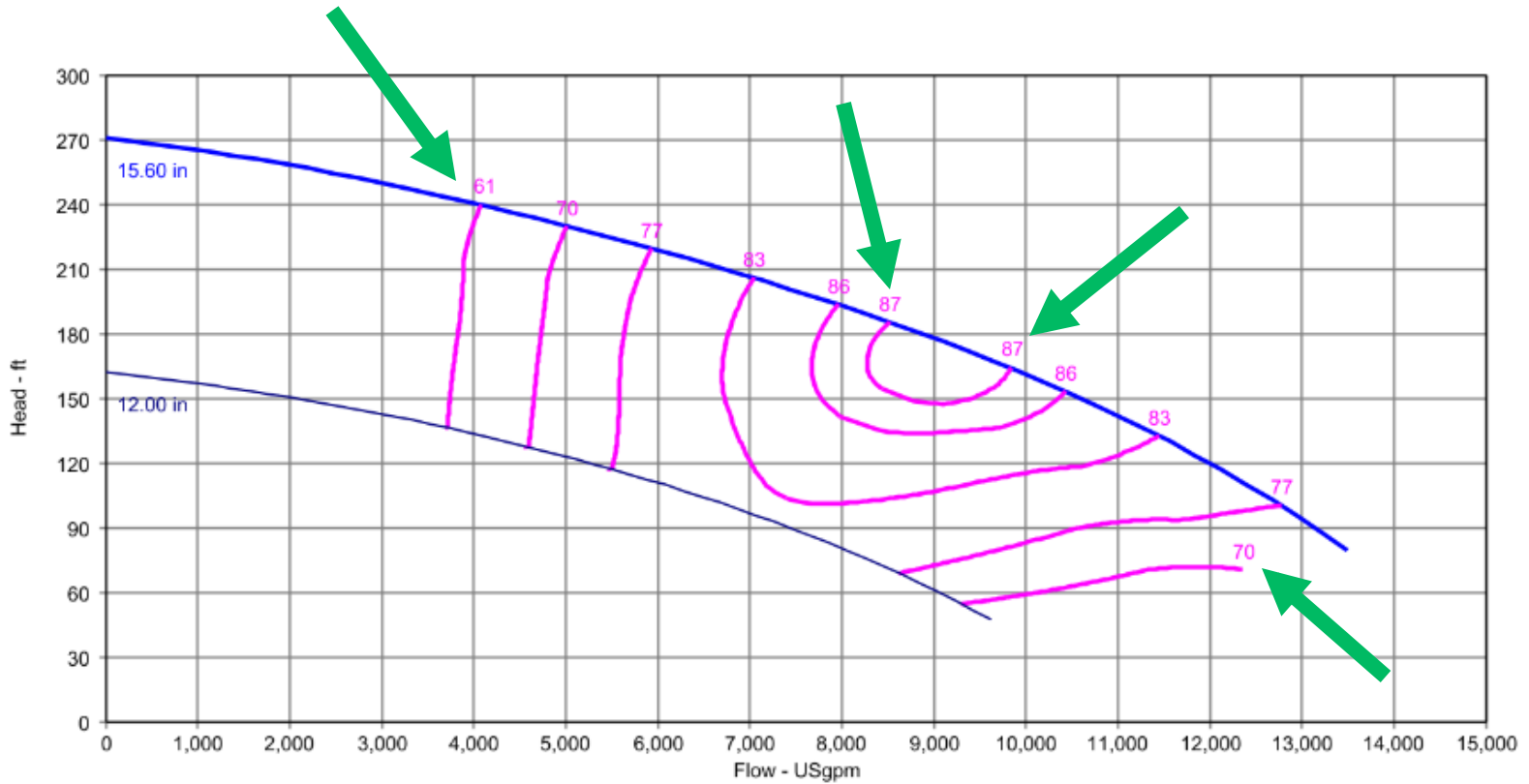
Preferred Operating Region



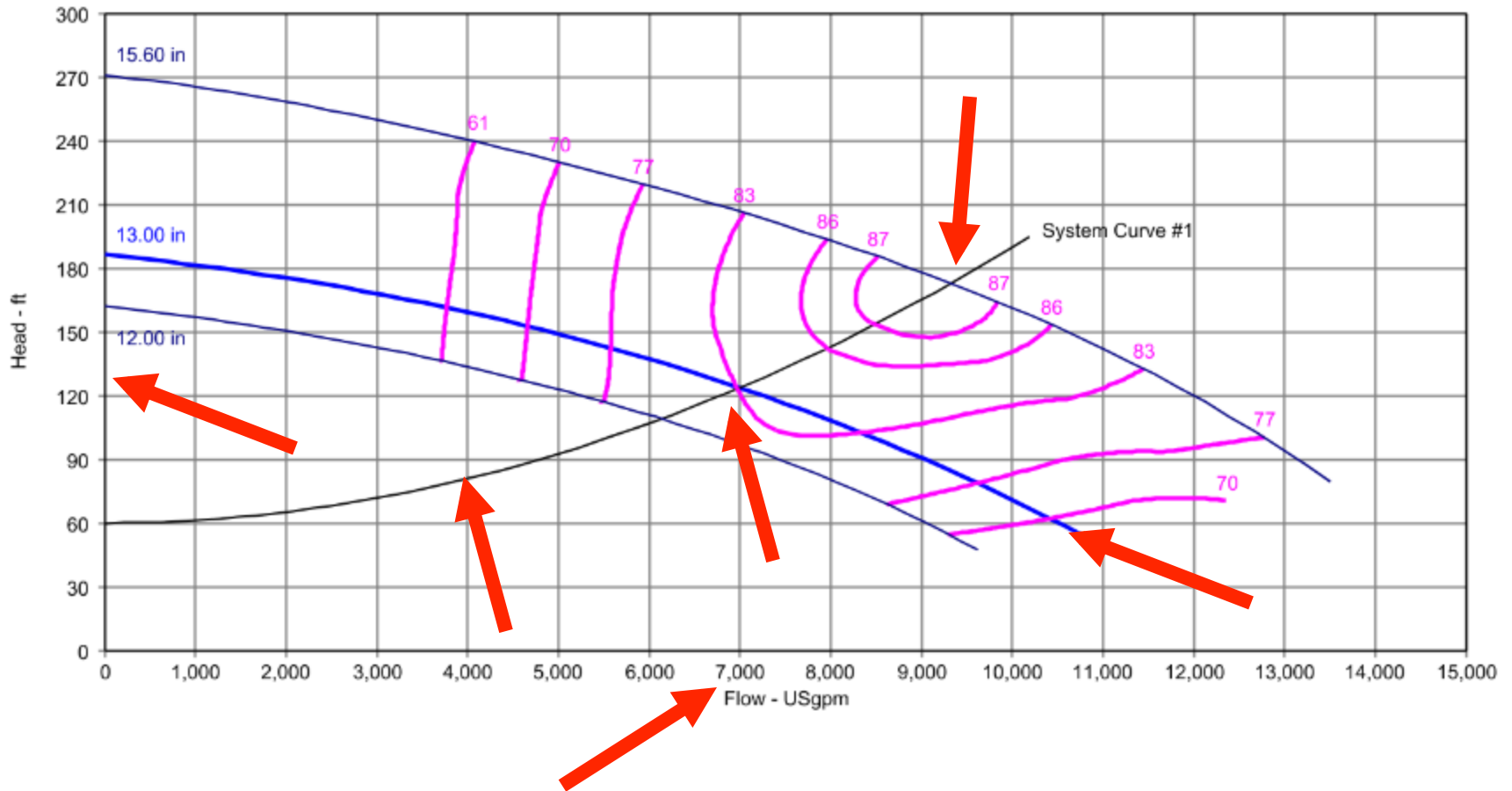
Using the Efficiency Curve



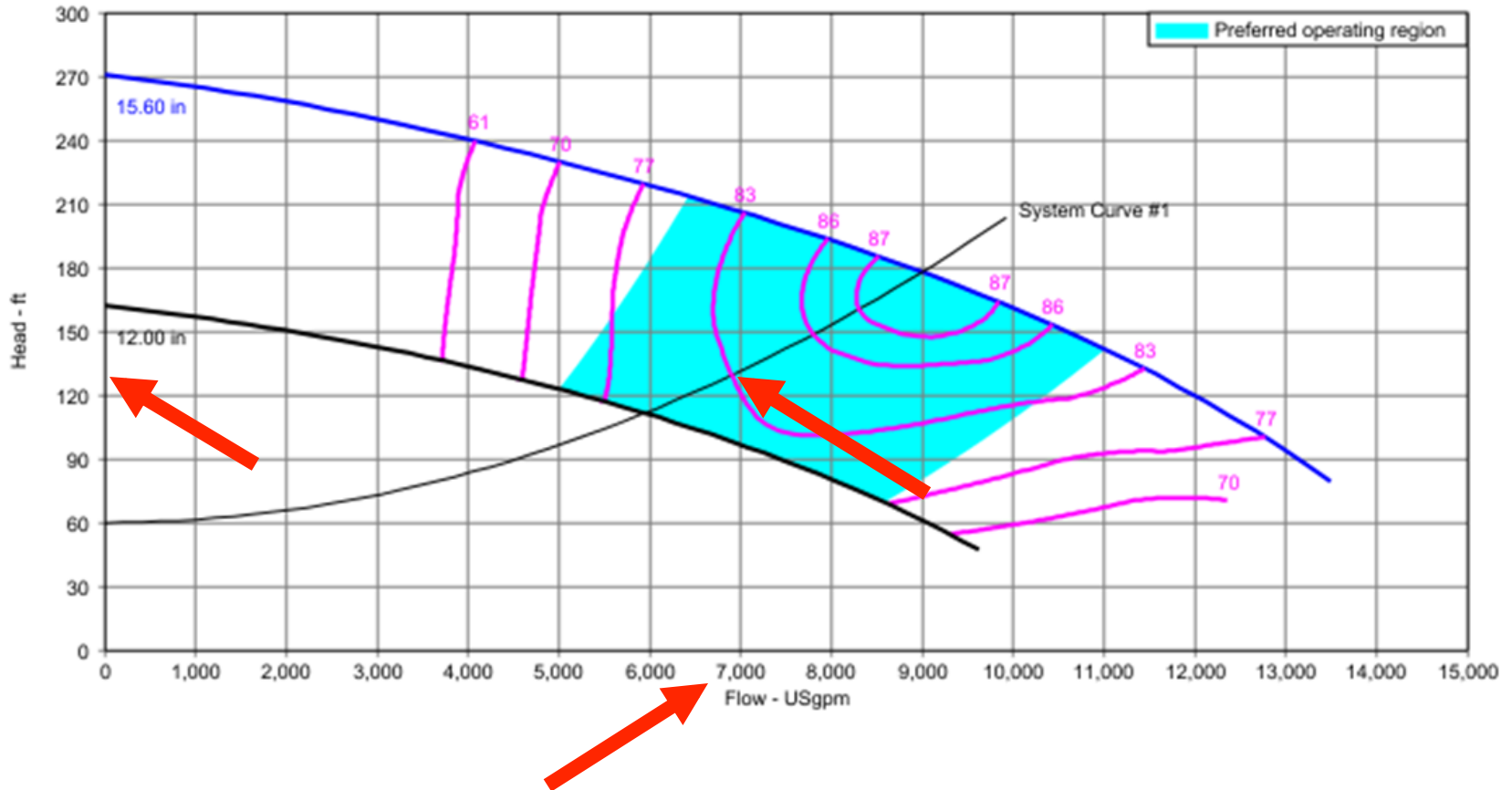
ISO Efficiency Lines



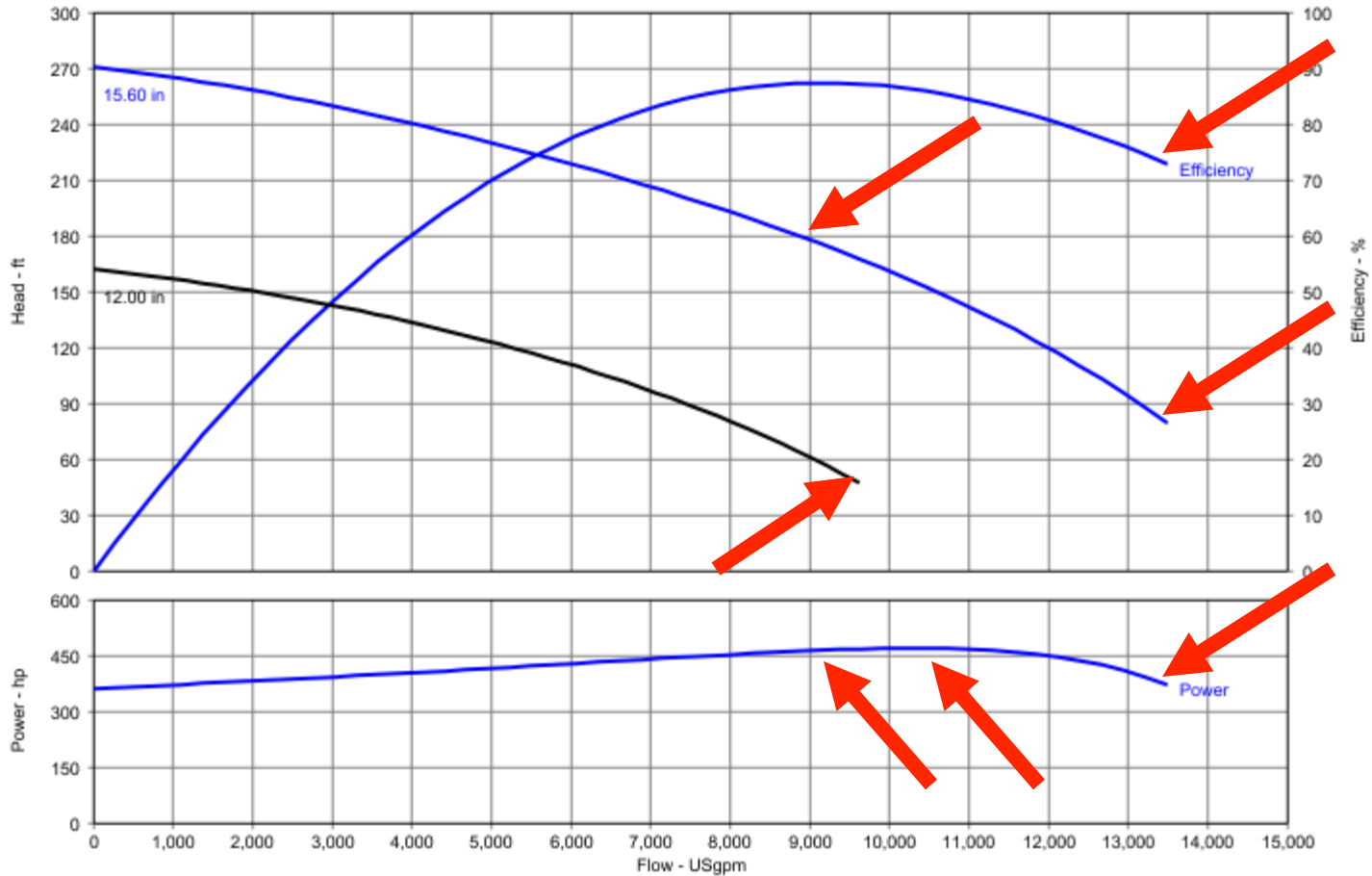
ISO Efficiency Lines



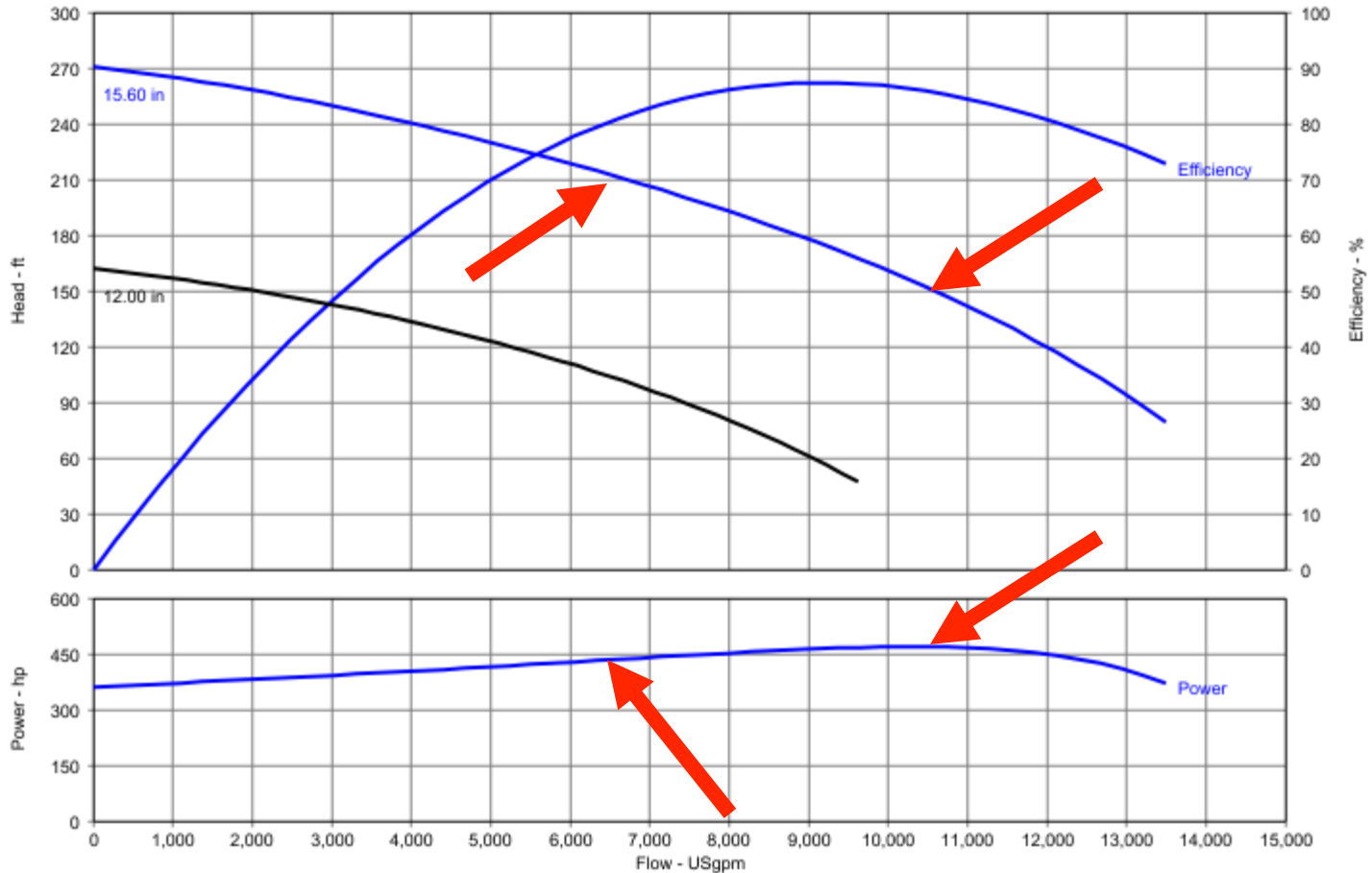
Was it a good selection?



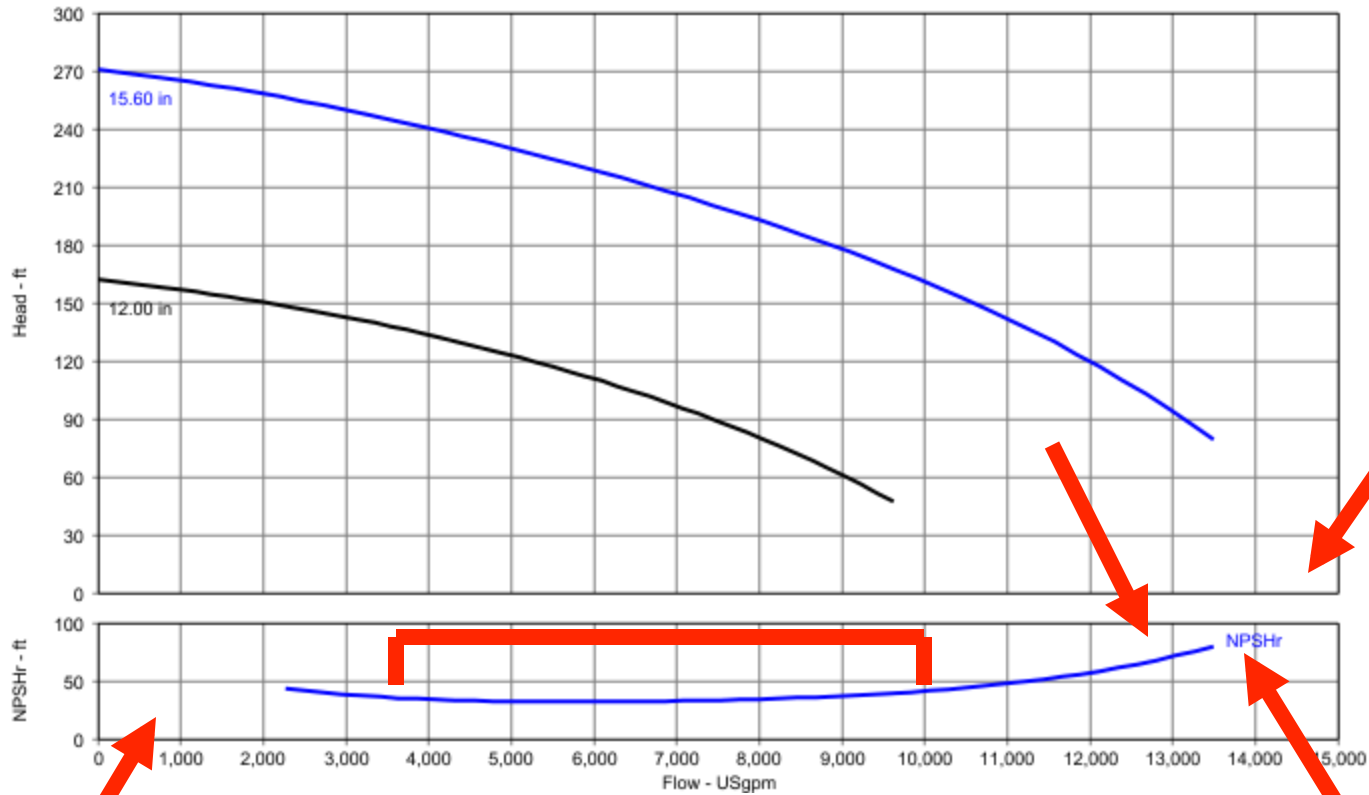
The Power Curve



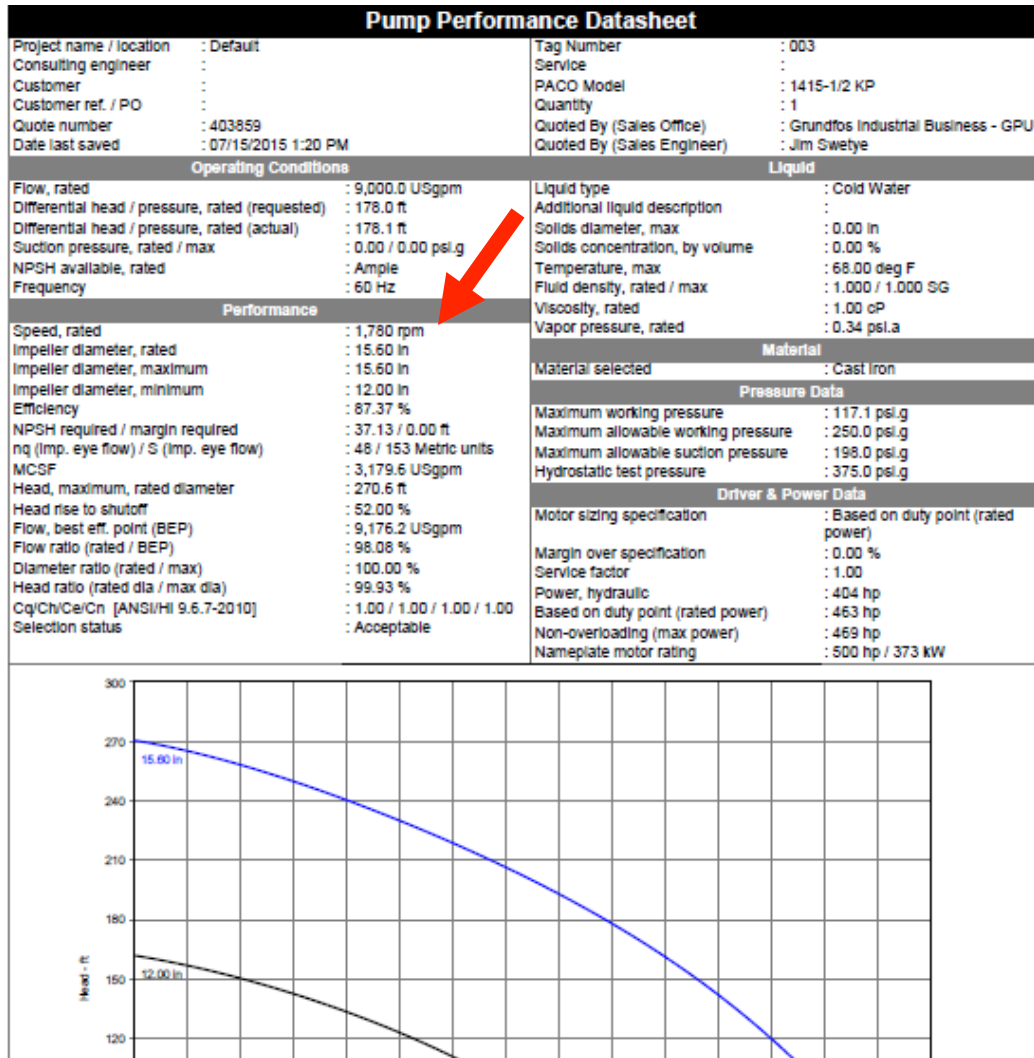
The Power Curve - Continued



Net Positive Suction Head - Required

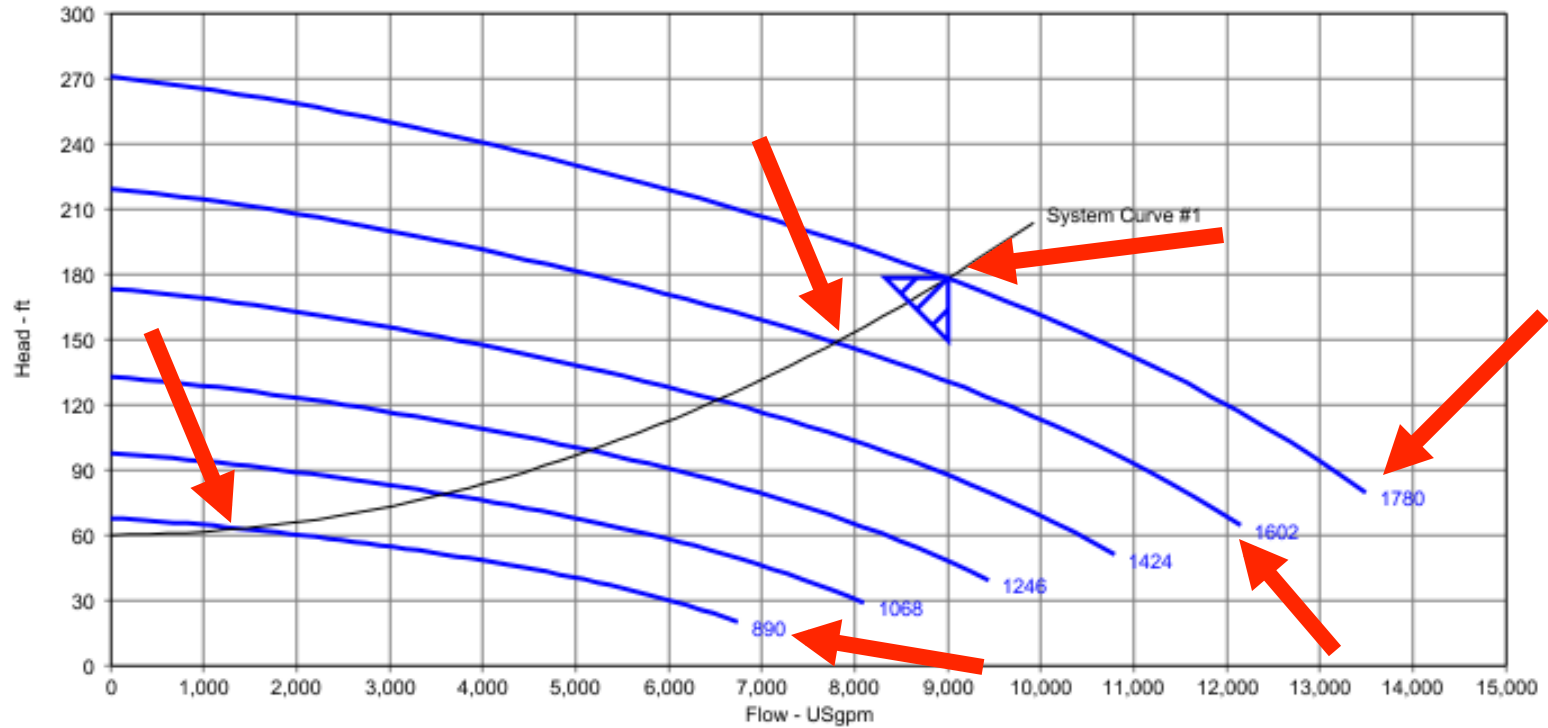


Single versus Variable Speed Performance Curves

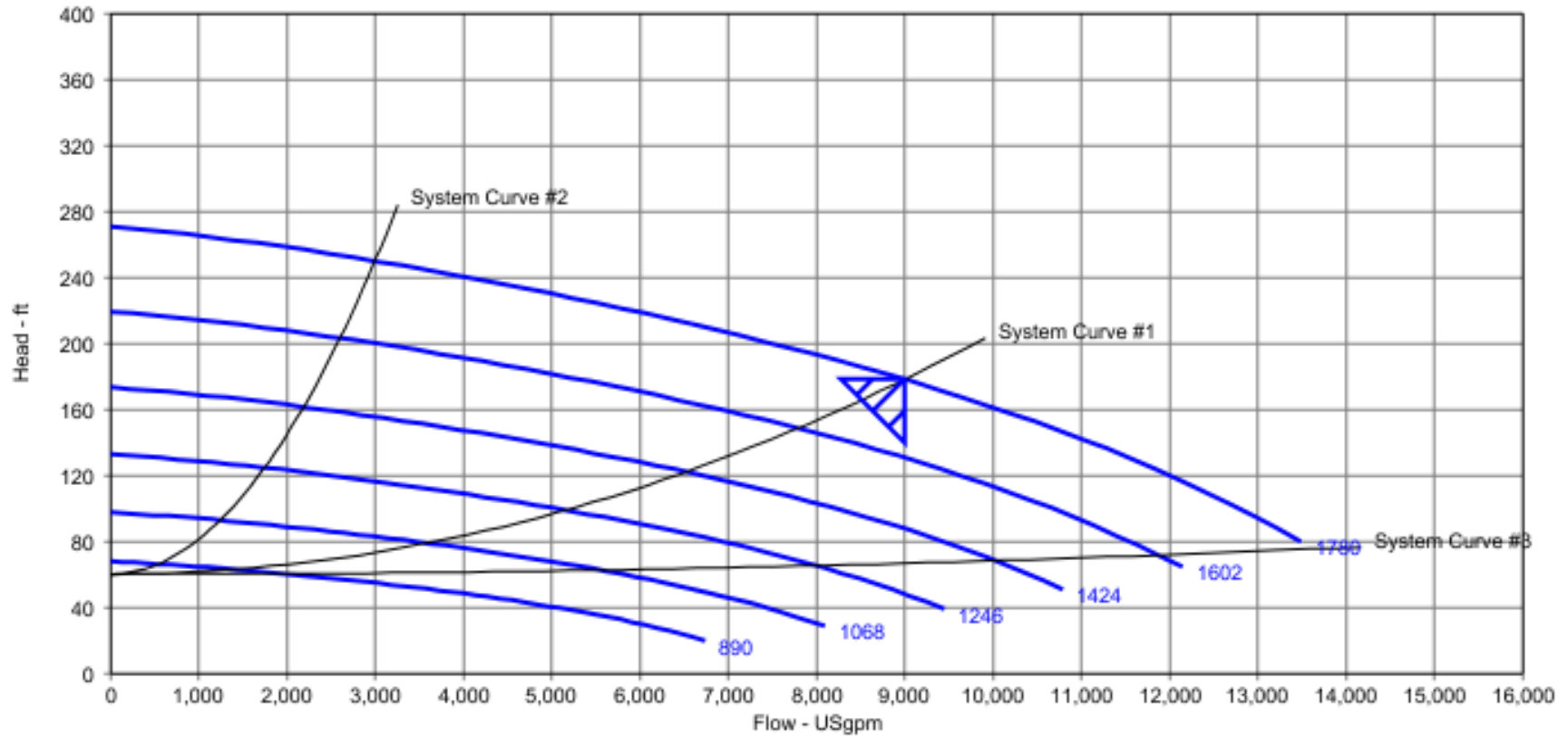


Single speed pump curve


The variable speed curve



The variable speed curve - continued



Checklist for Reading the Pump Curve

- |  | # | Item |
|---|----|---|
| <input type="checkbox"/> | 1 | What is the flow rate? |
| <input type="checkbox"/> | 2 | What is the head? |
| <input type="checkbox"/> | 3 | What is the impeller diameter? |
| <input type="checkbox"/> | 4 | What is the pump efficiency? |
| <input type="checkbox"/> | 5 | What is shutoff head? |
| <input type="checkbox"/> | 6 | What is runout flow? |
| <input type="checkbox"/> | 7 | Where does the specified duty point fall on the curve? |
| <input type="checkbox"/> | 8 | Will the pump perform within the Allowable Operating Region? |
| <input type="checkbox"/> | 9 | Will the pump perform within the Preferred Operating Region? |
| <input type="checkbox"/> | 10 | What is the load on the driver at the duty point? |
| <input type="checkbox"/> | 11 | What is the load on the driver at the maximum point on the curve? |
| <input type="checkbox"/> | 12 | What is the NPSHr? |
| <input type="checkbox"/> | 13 | Is there sufficient NPSHa? |
| <input type="checkbox"/> | 14 | Is there a better pump for the job? |

This list cannot possibly cover all possible scenarios, but provides a good starting point.

The Elements of a Pump Curve

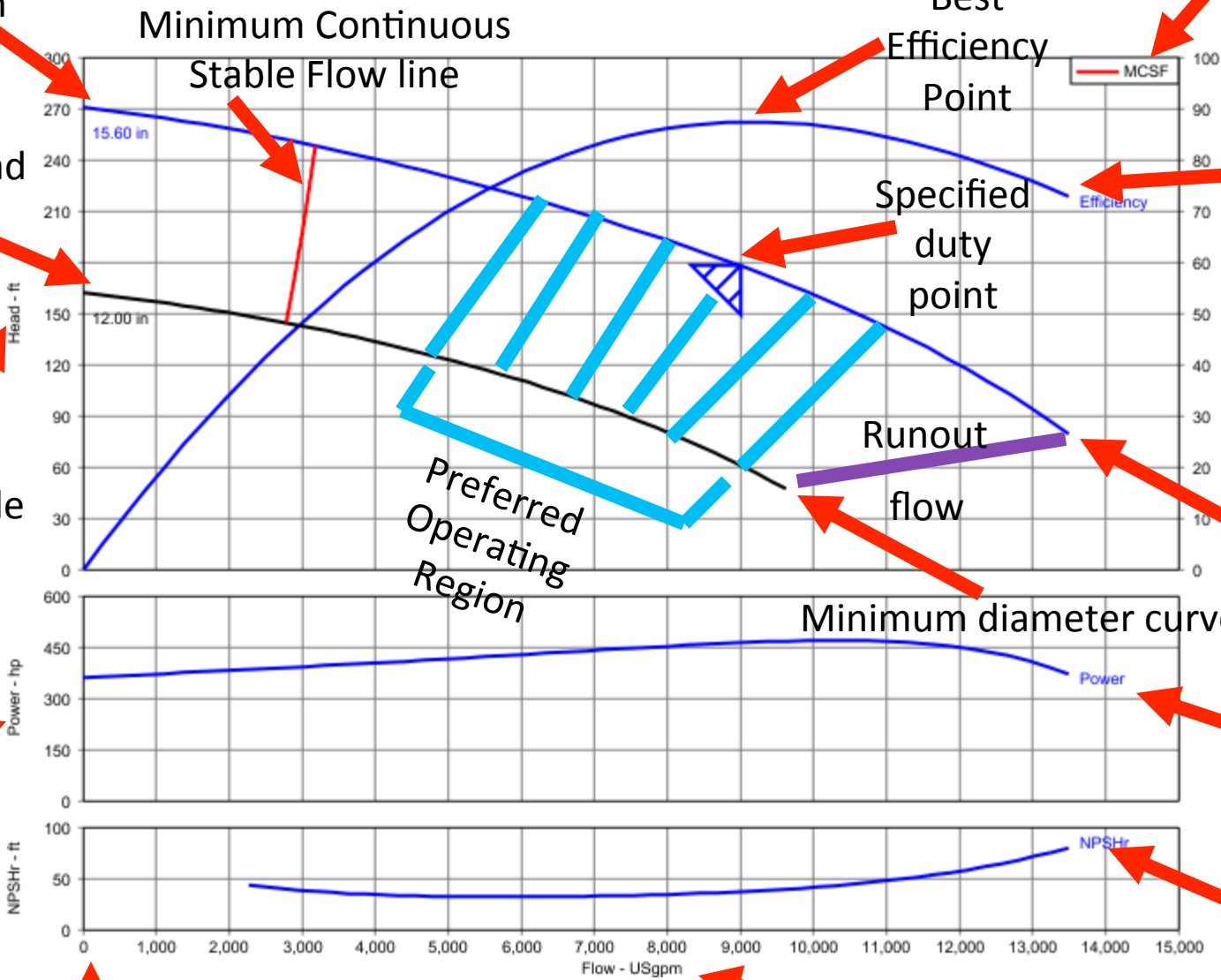
Shutoff head
maximum
diameter

Shutoff head
minimum
diameter

Head scale

Power
scale

NPSHr
scale



Minimum Continuous

Best
Efficiency
Point

Minimum
Continuous
Stable Flow
indicator

Efficiency
curve

Specified
duty
point

Efficiency
scale

Preferred
Operating
Region

Runout
flow

Maximum
diameter
curve

Minimum diameter curve

Power
curve

NPSHr
curve

Point of zero flow

Flow scale

Summary Slide of Learning Objectives:

You should now be able to:

1. Read the pump curve – Know what information is there and how it is formatted
2. Interpret the pump curve – Explain what the information means
3. Use the pump curve – Make decisions on choice of pump, motor sizing, power consumption strategies, and others

Questions & Answers

Use the chat feature to submit questions



Grundfos Technical Institute



Thank you!

www.grundfos.us/training