Nebraska Public Power District
Nebraska's Energy Leader

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NLS2001064
July 30, 2001

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Gentlemen:

Subject: Proposed License Amendment Related to Emergency Core Cooling System Pump Net Positive Suction Head Requirements
Cooper Nuclear Station, NRC Docket 50-298, DPR-46

References:

1. Letter (NLS2001053) from J. H. Swailes (NPPD) to USNRC dated May 30, 2001, "Revision of Commitment Made to Resolve NRC Generic Letter 97-04 Issues."

2. Letter (NLS980201) from J. H. Swailes (NPPD) to U.S. NRC, dated December 23, 1998, "Response to NRC Generic Letter 97-04 Request for Additional Information."

3. Letter from USNRC to J. H. Swailes (NPPD) dated November 24, 1998, "CNS Response to Request for Additional Information Pertaining to Generic Letter 97-04."

4. Letter (NLS970226) from G. R. Horn (NPPD) to U.S. NRC, dated January 5, 1998; "Response to NRC Generic Letter 97-04."

5. NRC Generic Letter 97-04 dated October 7, 1997, "Assurance of Sufficient Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal Pumps."

In accordance with the provisions of 10CFR 50.4 and 10CFR 50.90 and our commitment in References 1 and 2, the Nebraska Public Power District (NPPD) submits this request for amendment to Operating License DPR-46 to revise the Cooper Nuclear Station (CNS) license basis. This amendment request addresses several methodology changes and changes to the CNS licensing basis that are appropriate for Nuclear Regulatory Commission (NRC) review. The amendment will revise the licensing basis with respect to the containment overpressure contribution to emergency core cooling system (ECCS) pump net positive suction head (NPSH)

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requirements following a loss of cooling accident. The amendment will be documented in the CNS licensing basis by incorporating relevant information into the Updated Safety Analysis Report (USAR) following approval. Anticipated USAR revisions are provided for information in Attachment 3. This amendment request also provides a response to the NRC expectations for corrective action to obtain NRC review of the CNS licensing basis as identified in Reference 3.

The analysis which supports this amendment request is a bounding analysis which replaces the previously submitted analyses of ECCS pump NPSH (Reference 4). Review and approval by the NRC is required prior to incorporating certain changes into the CNS licensing basis. The amendment request discusses revisions in the methods and initial assumptions from previously approved analysis, and the results show an increase in the reliance on containment overpressure (a continuation of the previously approved exception to Safety Guide 1) and a reduction in the minimum margins of available containment overpressure when compared to the required pressure. However, the safety analysis also shows that adequate NPSH is available to support operation of the ECCS pumps when required following a design basis LOCA or secondary line break as requested in Reference 5.

Attachment 1 contains the description of the proposed change(s), the basis for the change(s), the attendant 10CFR 50.92 evaluation and the environmental impact evaluation (10CFR 51.22). Attachment 2 contains a detailed safety evaluation of the change. Attachment 3 contains the anticipated revisions of the affected CNS Updated Safety Analysis Report pages.

The proposed change has been reviewed by the necessary Station Operations Review Committee and the Safety Review and Audit Board, and NPPD has concluded that the proposed change does not involve a significant hazards consideration.

In accordance with the provisions of 10CFR 2.790, the three General Electric reports enclosed herewith, GE-NE-E1200141-04, GE-NE-T2300769-00-01, and GE-NE-T2300769-00-09, contain proprietary information and should be withheld from public disclosure. Enclosures 2, 3, and 4 include the applicable General Electric affidavits attesting to the proprietary nature of the information contained in the respective reports. A non-proprietary version of the GE reports will be submitted under separate letter.

By copy of this letter and attachments the appropriate State of Nebraska official is being notified in accordance with 10CFR 50.91(b)(1). Copies to the Region IV Office and the CNS Resident Inspector are also being sent in accordance with 10CFR 50.4(b)(1).

Should you have any questions concerning this matter, please contact David Kunsemiller at (402) 825-5236.

Sincerely,

John H. Swailes
Vice President of Nuclear Energy

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Attachments/Enclosures

Attachment 1- License Amendment Request (LAR)
Attachment 2- LAR Safety Evaluation
Attachment 3- LAR USAR Revisions

Enclosure 1- CNS Calculation NEDC 97-044A, NPSH Margins for the RHR and CS Pumps
Enclosure 2- GE Report NE-E1200141-04, Decay Heat Evaluation for CNS
Enclosure 3- GE Report NE-T2300786-00-01, Containment System Response for NPSH Analysis
Enclosure 4- GE Report NE-T2300786-00-09, Evaluation of Steam Ingestion in the ECCS Suction Strainers

cc: Regional Administrator
USNRC - Region IV

Senior Project Manager
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector
USNRC

Nebraska Health and Human Services
Department of Regulation and Licensure

NPG Distribution

Records

STATE OF NEBRASKA)
)
NEMAHA COUNTY)

John H. Swailes, being first duly sworn, deposes and says that he is an authorized representative of the Nebraska Public Power District, a public corporation and political subdivision of the State of Nebraska; that he is duly authorized to submit this correspondence on behalf of Nebraska Public Power District; and that the statements contained herein are true to the best of his knowledge and belief.

John H. Swailes

Subscribed in my presence and sworn to before me this 30th day of July, 2001.

Wilma M Werner
NOTARY PUBLIC

Wilma M. Werner
General Notary
State of Nebraska
My Commission Expires Oct. 26, 2002

LICENSE AMENDMENT REQUEST
REVISION TO ECCS PUMP NPSH ANALYSIS

COOPER NUCLEAR STATION
NRC DOCKET NO. 50-298, LICENSE DPR-46

1.0 INTRODUCTION

The Nebraska Public Power District (NPPD) requests that the Nuclear Regulatory Commission (NRC) approve a license amendment to revise the Cooper Nuclear Station (CNS) licensing basis and analytical methods. The license amendment will result in an amendment to the Updated Safety Analysis Report (USAR) to incorporate an updated analysis which demonstrates adequate net positive suction head (NPSH) for the low pressure emergency core cooling system (ECCS) pumps following a large break loss of coolant accident (LOCA). The analysis indicates that CNS continues to require an exception to the guidelines of Atomic Energy Commission (AEC) Safety Guide (SG) 1 which contains the regulatory position that containment overpressure should not be credited for assuring adequate ECCS pump NPSH.

NPPD specifically requests NRC approval to allow:

(1) reliance on containment overpressure (~5 psi) for core spray (CS) pump runout, resulting in margin of ~1.9 psi when compared to the available containment overpressure (~6.9 psi) during worst case short-term LOCA conditions (i.e., at or less than 600 seconds);

(2) reliance on containment overpressure (~4.5 psi) for CS pump operation and (~6.5 psi) for residual heat removal (RHR) pump operation, with margins of ~5 psi and ~3 psi, respectively, when compared to the available containment overpressure (~9.5 psi) during worst case long-term LOCA conditions (i.e., greater than 600 seconds) at peak suppression pool temperatures; and

(3) reliance on containment overpressure for CS and RHR pump operation, with minimum margins of ~0.6 psi (this minimum margin occurs in the long-term, just prior to 100 hours into the event, at a point when no containment overpressure is required for ECCS pump NPSH. During times when containment overpressure is credited, there is a minimum of ~1 psi containment overpressure available.

Further, NPPD specifically requests NRC approval to allow use of the revised calculation methods and analysis assumptions identified in this amendment request, including 1) the use of American Nuclear Society (ANS) 5.1-1979 decay heat model with conservatism equivalent to two sigma (standard deviation) uncertainty addition, 2) the use of the SHEX computer code for determination of containment pressure and temperature response, and 3) use of a spatial evaluation to allow elimination of the local suppression pool temperature limit.

2.0 NECESSITY FOR LICENSE AMENDMENT

This license amendment fulfills an NPPD agreement (References 1 & 2) to provide, for NRC review and approval, an analysis to support revision of the licensing basis for operation of CNS with respect to ECCS pump NPSH requirements. The license amendment expands on an NPPD exception to SG 1 approved by the AEC at initial plant licensing (i.e., the crediting of containment overpressure to assure adequate ECCS pump NPSH) for certain unexpected accident scenarios.

During initial plant licensing, the AEC staff questioned CNS's compliance with the guidance of SG 1, "Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal System Pumps." In particular, the AEC questioned whether CNS satisfied the SG 1 position that no credit be assumed from containment overpressure, to assure adequate NPSH for the ECCS pumps during LOCA conditions. In response to this question, CNS cited a calculation, which determined the minimum containment pressure following a large break LOCA. This calculation indicated that, although CNS did not meet the SG 1 guidance, there was sufficient margin between the calculated containment overpressure and the overpressure required to assure adequate ECCS pump NPSH.

In the Safety Evaluation Report (SER) for the initial plant license (Ref. 5), the AEC approved an exception to the SG 1 criterion allowing credit for containment overpressure to assure adequate NPSH for the low pressure ECCS pumps. As stated in the SER, this exception was granted based on the conservatism inherent in the minimum containment pressure calculation and the margins between the containment overpressure and the amount of overpressure required to assure adequate ECCS pump NPSH. The SER also indicated that at least a 3 psi margin existed between minimum containment pressure and the pressure required for NPSH for the RHR pumps and that a 6 psi margin existed regarding the CS pumps.

NPPD incorporated the SER discussion and approval as the CNS licensing basis maintaining the 3 and 6 psi margins between minimum available containment pressure and required pump NPSH. Subsequently, several changes have occurred which could have an effect on the analysis of available NPSH for the ECCS pumps. These include:

- The maximum suppression pool temperature allowed during normal plant operation has been increased from 90°F to 95°F.

- The maximum service water (SW) temperature allowed during normal plant operation has been increased from 85°F to 90°F.

- The RHR system heat exchanger minimum performance criteria (i.e., minimum heat removal factor "K") has been decreased to a value of 177 Btu/sec-°F to provide tube plugging margin.

- The decay heat model has been changed from the May-Witt to the ANS 5.1-1979 model.

- The ECCS suction strainers have been modified and the allowable debris loading and thus the pressure drop across the strainers has been changed as a result of actions to address NRC Bulletin 96-03.

The above changes have contributed to an increase in the required contribution from the calculated containment overpressure to assure adequate NPSH for the low pressure ECCS pumps following a large break LOCA.

By Reference 3, the NRC clearly indicated that the original SER established a licensing basis which allowed CNS to rely on a slight amount of containment overpressure for long-term RHR pump operation, i.e., "on the order of 1 psi." However, the letter also indicated that the allowed reliance was for long-term conditions and did not apply to CS pumps in the short-term, i.e., short-term requirements were not addressed. Some concerns with the apparent use of different calculation methods and analysis assumptions were also noted. In response, NPPD agreed to submit a license amendment request to address the specific concerns.

In the interim, NPPD performed Operability Evaluations (OE) following the guidelines of Generic Letter 91-18, Revision 1. The evaluation demonstrates that the ECCS pumps are operable, although nonconforming, and that they are capable of fulfilling their safety function as required. Further, additional acceptance criteria have been incorporated into the residual heat removal heat exchanger performance testing surveillance procedure to further ensure that the assumptions in the OE remain valid. These additional acceptance criteria remain in effect pending satisfactory resolution of NRC concerns.

The safety evaluation provided in Attachment 2 addresses the analysis methods and assumptions, and demonstrates that reliance on containment overpressure and the margin between minimum available and required pressure is acceptable. Analysis shows that adequate CS and RHR pump margins are maintained with the following considerations:

- large break (worst case) LOCA conditions,

- SW temperature and initial torus water temperature analyzed at higher temperatures of 95°F and 100°F, respectively, in anticipation of a future amendment request,

- reduced RHR heat exchanger efficiency to account for projected performance,

- ANS 5.1 decay heat model (with conservatism equivalent to a two sigma uncertainty addition), including consideration of additional actinides and activation products as specified in General Electric (GE) Service Information Letter (SIL) 636,

- design basis ECCS strainer debris loading as discussed in NRC Bulletin 96-03,

- assumed primary containment leakage at 5% per day, which is almost a factor of eight higher than allowed by Technical Specification (TS) 5.5.12.c at peak accident pressure (additional,

sensitivity studies were conducted assuming 0.635% per day leakage allowed by TS 5.5.12.c), and

- other conservative assumptions consistent with the original license analysis.

These assumptions are discussed in Attachment 2, Section 4.

3.0 DESCRIPTION OF UPDATED SAFETY ANALYSIS REPORT CHANGES

The Updated Safety Analysis Report (USAR) marked up pages required to describe the latest ECCS pump NPSH analysis in post LOCA conditions are provided in Attachment 3 for reference. These include the following anticipated revisions to the analysis methods, assumptions, and results discussed in USAR Chapter VI, Section 5.3:

(1) The reactor is initially at 102 percent of rated thermal power (RTP) per Regulatory Guide 1.49. The ANS 5.1 decay heat model is used assuming an exposure of 35,000 MWd/MT (amount of energy generated per unit metric-ton fuel mass) and a core average time at power of four years. The ANS 5.1 decay heat model used includes two sigma uncertainty adder and accounts for additional actinides and activation products specified in GE SIL 636.

(2) During the event, the portion of feedwater in the feedwater system that is at a temperature higher than 212°F after absorbing additional energy from the feedwater piping as it flows toward the vessel is injected into the vessel. This hot portion of the feedwater inventory is transferred to the vessel regardless of the availability considerations of feedwater and condensate pumps.

(3) An RHR heat exchanger K-value of 177 Btu/sec-°F is used, consistent with the minimum thermal capability of a single RHR heat exchanger operating in containment spray mode.

(4) Use of containment sprays is conservative for ECCS NPSH analysis, since containment spray mode results in slightly higher suppression pool temperature and lower containment pressure.

(5) Fibrous and miscellaneous containment debris loading is included in accordance with NRC Bulletin 96-03 and Boiling Water Reactor Owners Group methodologies (USAR Section VI references 60, 61, and 67). A flow blockage area of greater than 4.5 sq. ft. is assumed for each strainer in determining clean strainer head-loss. These analysis assumptions result in minimized flow area for the ECCS pump suction inlets from the suppression pool.

(6) New Figure VI-5-15, Minimum Containment Pressure for Operation of ECCS Pumps, for 0 to 1000 sec, and new Figure VI-5-16, Minimum Containment Pressure for Operation of ECCS Pumps, for 1000 sec to 10 E6 sec, showing the containment response and required

containment overpressure for RHR and CS pump NPSH under LOCA conditions for both the short and long-term replace the old Figure VI-5-15.

(7) Sensitivity studies have been conducted to evaluate the effects of instrument uncertainty and bounding case definitions for both CS and RHR pumps. These studies show that even when these highly unlikely scenarios are postulated adequate margin exists between available overpressure and required overpressure, thus ensuring adequate NPSH exists for the ECCS pumps.

(8) Evaluation has shown that steam bubble ingestion is not a concern for ECCS pumps due to the arrangement of the quenchers and the suction strainers in the suppression pool.

In addition, the USAR revisions include information to address updating Section 7 of the Plant Unique Analysis Report. This update identifies the deletion of the local suppression pool temperature limit based on NEDO-30832-A and an evaluation of the likelihood of steam ingestion in the ECCS suction strainers during SRV actuation. The evaluation is based on spatial arrangement of the quenchers and strainers within the pool and shows steam bubble ingestion is not predicted.

4.0 NO SIGNIFICANT HAZARDS CONSIDERATION EVALUATION

10CFR 50.91(a)(1) requires that licensee requests for operating license amendments be accompanied by an evaluation of no significant hazards posed by the issuance of the amendment. This evaluation is to be performed with respect to the criteria given in 10CFR 50.92 (c). The following analysis meets those requirements.

Evaluation of this Amendment with Respect to 10CFR 50.92

The enclosed USAR changes, necessary to implement the proposed license amendment, are judged to involve no significant hazards based on the following:

1. *Does not involve a significant increase in the probability or consequences of an accident previously evaluated*

   The requested license amendment does not result in any new accident initiators, nor are there changes being proposed to other plant systems or equipment postulated to initiate an accident previously evaluated. Thus, the proposed change does not involve a significant increase in the probability of an accident previously evaluated in the USAR.

   The containment overpressure evaluation conservatively demonstrates that adequate margin between the available containment overpressure and the overpressure required to assure adequate low pressure ECCS pump NPSH are such that ECCS pump operation, as credited in the CNS accident analysis, remains unchanged. Thus, the ECCS pumps continue to be available to perform the safety functions previously evaluated, and the proposed change does

not involve a significant increase in the consequences of an accident previously evaluated in the USAR

2. *Does not create the possibility for a new or different kind of accident from any accident previously evaluated*

   The proposed license amendment does not introduce any new equipment or hardware changes. The only equipment affected by this license amendment are the low pressure ECCS pumps. These pumps retain their ability to function following any accident previously evaluated and no new accidents are created as a result of increased reliance on overpressure or methodology changes. Thus, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated in the USAR.

3. *Does not create a significant reduction in the margin of safety*

   Although there is an increased reliance on containment overpressure, adequate low pressure ECCS pump NPSH is assured, and sufficient margin is conservatively determined to be maintained between the available overpressure and the required overpressure to provide confidence that the ECCS pumps will operate as required. The calculations are revised to show an increased absolute containment overpressure consideration from ~5 psi (original license application) to ~9.5 psi at the time of the peak suppression pool temperatures following a design basis LOCA. At this containment overpressure, the CS and RHR pumps will utilize only ~4.45 psi and ~6.47 psi, respectively, of the available overpressure. This provides a margin of ~5 psi and ~3 psi, respectively, for the CS and RHR pumps at the peak suppression pool temperature. The calculations also address both short-term and long-term reliance on containment overpressure.

   In the short-term (<600 seconds), the RHR pumps do not depend on containment overpressure for adequate NPSH. However, during this short-term period following initiation of the event, the CS pump is conservatively calculated to require as much as ~4.94 psi of containment overpressure to assure adequate NPSH. At the time this overpressure is needed, ~6.85 psi of containment overpressure is available, providing a margin of ~1.9 psi. For the time periods following the peak suppression pool temperature, the required overpressure reliance reduces with time and suppression pool temperature.

   During the accident, beyond the time period of the peak suppression pool temperature, a minimum margin of ~0.6 psi is provided for ECCS pump NPSH. However, this minimum margin occurs just prior to 100 hours into the event at a point when no containment overpressure is required for ECCS pump NPSH. During times when containment overpressure is credited, there is a minimum of ~1 psi containment overpressure available.

   The analysis also utilizes three new methods for evaluation of the previously evaluated accidents. These are the SHEX code for the containment pressure and temperature response analysis, the ANS 5.1-1979 model for determination of core decay heat, and the use of spatial evaluation of the suppression pool safety relief valve discharge quenchers relative to the

ECCS pump intake strainers for prevention of steam bubble ingestion. A benchmark evaluation of the SHEX code is provided which indicates that the results are comparable to previous analysis. The ANS 5.1-1979 model is less conservative than the previously used May-Witt model. However, this change in conservatism is offset by the use of other input parameter changes such as reduced RHR heat exchanger heat removal assumptions and increased service water and suppression pool temperature assumptions. Additionally, both the SHEX code and the ANS 5.1 decay heat model have been previously accepted by NRC as sufficiently conservative analysis methods. The spatial evaluation of the suppression pool safety relief valve discharge quenchers relative to the ECCS pump intake strainers shows steam bubble ingestion is not predicted. This supports the elimination of a local suppression pool temperature limit.

Therefore, sufficient margin and adequate NPSH are demonstrated with the conservatism of a two sigma (two standard deviations) uncertainty in the decay heat model, increased suction strainer debris loading, decreased RHR heat exchanger minimum performance criteria, and increases in SW and suppression pool temperatures. Thus, the proposed activity does not involve a significant reduction in a margin of safety.

5.0 ENVIRONMENTAL IMPACT EVALUATION

10CFR 51.22(c)(9) provides criteria for, and identification of, licensing and regulatory actions eligible for categorical exclusion from performing an environmental assessment. A proposed amendment to an operating license for a facility requires no environmental assessment if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant hazard consideration, (2) result in a significant change in the types or significant increase in the amount of any effluents that may be released offsite, or (3) result in an increase in individual or cumulative occupational radiation exposure. NPPD has reviewed the proposed license amendment and concludes that it meets the eligibility criteria for categorical exclusion set forth in 10CFR 51.22(c)(9). Pursuant to 10CFR 51.22(c), no environmental impact statement or environmental assessment needs to be prepared in connection with issuance of the proposed license changes. The basis for this determination is as follows:

1. As discussed in the No Significant Hazards Consideration Evaluation, the proposed license amendment does not involve a significant hazard consideration.

2. As discussed in the No Significant Hazards Consideration Evaluation, this proposed change does not result in an increase in radiological doses for any design basis accident as there is no increase in accident consequences. This proposed license amendment does not result in a change in the types or amounts of any effluents that may be released offsite. The proposed license amendment does not introduce any new equipment, nor does it require any existing equipment or systems to perform a different type of function than they are presently designed to perform. Additionally, the amendment will not result in an increase in the types or amounts of any effluents that may be released offsite and the proposed changes do not

involve irreversible environmental consequences beyond those already associated with normal operation.

3. These changes do not adversely affect plant systems or operation and therefore, do not significantly increase individual or cumulative occupational radiation exposure beyond that already associated with normal operation.

6.0 PRECEDENT

The requested reliance on containment overpressure is similar in methodology and results to that approved for Peach Bottom Atomic Power Station, Unit Nos. 2 and 3, as Amendment Nos. 233 and 237 to Facility Operating License Nos. DPR-44 and DPR-56, respectively, on August 14, 2000.

7.0 CONCLUSION

NPPD has evaluated the proposed license amendment, and the associated changes to the ECCS pump NPSH analysis. The conclusion of this evaluation is that there are no significant hazards or safety concerns associated with this proposed license amendment. Therefore, for the reasons detailed above, NPPD requests NRC approval of this proposed license amendment.

8.0 REFERENCES

1. Letter (NLS2001053) from J. H. Swailes (NPPD) to USNRC dated May 30, 2001, "Revision of Commitment Made to Resolve NRC Generic Letter 97-04 Issues."

2. Letter (NLS980201) from J. H. Swailes (NPPD) to U.S. NRC, dated December 23, 1998, "Response to NRC Generic Letter 97-04 Request for Additional Information."

3. Letter from USNRC to J. H. Swailes (NPPD) dated November 24, 1998, "CNS Response to Request for Additional Information Pertaining to Generic Letter 97-04."

4. NRC Generic Letter 97-04, "Assurance of Sufficient Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal Pumps."

5. Section 6.3, Emergency Core Cooling Systems (ECCS), of the Safety Evaluation by the Directorate of Licensing, U.S. Atomic Energy Commission in the Matter of Nebraska Public Power District, Cooper Nuclear Station, Nemaha County, Nebraska, Docket No. 50-298, issued February 14, 1973.

LICENSE AMENDMENT REQUEST
SAFETY EVALUATION FOR
REVISION TO ECCS PUMP NPSH ANALYSIS

COOPER NUCLEAR STATION
NRC DOCKET NO. 50-298, LICENSE DPR-46

1.0 PURPOSE

This safety evaluation provides the results of the NPPD evaluation of the acceptability of the proposed license amendment from a safety perspective. The associated Updated Safety Analysis Report (USAR) changes are provided in Attachment 3.

2.0 SYSTEMS AND ACCIDENT ANALYSIS AFFECTED

2.1 Systems Affected

The systems affected by this license amendment are the primary containment (PC), residual heat removal (RHR) system and the core spray (CS) system.

2.2 Accidents Analysis Affected

The accident analysis affected by this change is the large break loss of coolant accident (LOCA). Other accident analyses which also result in significant suppression pool temperatures are also evaluated to determine the large break LOCA as the bounding event for ensuring adequate NPSH margins.

3.0 BACKGROUND

3.1 Initial License Basis

Safety Guide (SG) 1, "Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal System Pumps," identifies the Nuclear Regulatory Commission (NRC) position that no credit be taken for calculated increases in containment overpressure, i.e., any pressure greater than initial containment pressure, when calculating the available net positive suction head (NPSH) for the low pressure emergency core cooling system (ECCS) pumps following a LOCA. In Final Safety Analysis Report Question 6.4 (FSAR Q&A) the Atomic Energy Commission (AEC) requested that CNS outline its conformance to SG 1. CNS responded by citing a calculation, which had been performed to determine the minimum containment overpressure following a LOCA.

The following assumptions were used in the original analysis to conservatively evaluate low pressure ECCS pump NPSH requirements and to minimize credit for the calculated available containment overpressure:

- an initial drywell temperature of 150°F, which minimizes the initial non-condensible gas mass and thus, minimizes the long-term containment pressure,
- an initial drywell pressure of zero psig since a reduced initial containment pressure will result in a lower containment pressure following the LOCA, and
- a post accident containment leak rate of 5% per day without consideration of actual containment pressure (almost a factor of eight higher than allowed by the Technical Specifications (TS) and 10CFR Part 50 Appendix J testing at the peak accident pressure).

To maximize the suppression pool temperature following the LOCA, the following assumptions were included in the original license application analysis:

- no credit for heat loss through containment walls,
- a power level based on 105% steam flow, 2486 MWt,
- an initial suppression pool temperature of 90°F,
- a service water (SW) temperature of 85°F,
- a minimum combination of available ECCS pumps, and
- RHR containment spray mode initiated at 10 minutes and continued throughout the event.

Other specified assumptions of the original license application analysis included:

- a loss of off-site power (LOOP) and the failure of one diesel generator (DG) at the beginning of the event resulting in the availability of only one RHR suppression pool cooling loop with one SW and one RHR SW booster (RHRSWB) pump, and
- the May-Witt decay heat model.

The original license application calculation indicated that CNS RHR pumps did not satisfy the guidelines of SG 1 since a contribution was required from containment overpressure to assure adequate low pressure ECCS NPSH in a worst case long-term post LOCA condition. The response to FSAR Q&A 6.4 indicated that, at the time when the pool temperature is at its maximum, the RHR pumps required a contribution of approximately 1.9 psi from the containment overpressure to provide adequate NPSH. The calculation also indicated that the available containment pressure at the time of the maximum suppression pool temperature (192°F) was sufficient to assure that there was a minimum of a 3 psi margin above the pressure

required to assure adequate ECCS pump NPSH. Finally, the original license application calculations indicated the CS pumps had adequate NPSH without any contribution from containment overpressure and showed a minimum margin of 6 psi at the time of the maximum suppression pool temperature.

The AEC, in their Safety Evaluation Report (SER) dated February 14, 1973, accepted this non-conformance with the SG 1 guidelines based on a 3 psi margin for the RHR pumps and a 6 psi margin for the CS pumps and the conservatism inherent in the minimum available containment pressure calculation. As discussed later in this submittal, this "margin" was incorporated into the CNS design and licensing basis for NPSH analysis. Therefore, changes made at CNS since the original license have been evaluated from the perspective of maintaining this margin.

3.2 Suppression Pool Temperature TS Change

A 1983 TS change (Amendment 82) affected the contribution of containment overpressure to ECCS pump NPSH. This TS change requested that the maximum allowed suppression pool temperature during normal operation be raised from 90°F to 95°F. This revised limit is currently reflected in TS 3.6.2.1.

3.3 Maximum SW Temperature Change

In 1990, CNS increased the maximum SW temperature from 85°F to 90°F. At that time, SW temperature was not specified in the CNS TS (later incorporated in 1998 via Amendment 178). The analysis of the effect of the change on the available low pressure ECCS pump NPSH used the same parameters as the original licensing analysis except that the SW temperature was increased from 85°F to 90°F and (per Amendment 82 as discussed above) the initial pool temperature was increased from 90°F to 95°F. The low pressure ECCS pump NPSH margins were shown to be greater than 3 psi and 6 psi for RHR and CS, respectively. The results of this analysis were approved by CNS under 10CFR 50.59 and incorporated into the USAR.

3.4 Analysis to Increase RHR Heat Exchanger Tube Plugging Margin

In 1993 CNS identified that the 4% tube plugging margin for the RHR heat exchangers may not be adequate for future operating cycles. In order to increase the allowable tube plugging margin, the minimum RHR heat exchanger heat removal factor, K, was reduced to 177 Btu/sec-°F. CNS analyzed the plant response to accidents with this reduced RHR heat exchanger heat removal factor and included a calculation of the available ECCS pump NPSH using the same parameters as the above initial licensing analysis with the following exceptions:

- The ANS 5.1-1979 decay heat model was used instead of the May-Witt model. The ANS 5.1-1979 model was endorsed by NRC in a letter from A. Thadani to G. Sozzi (GE) dated July 13, 1993, "Use of SHEX Computer Program and ANSI/ANS 5.1-1979 for Containment Long-term Pressure and Temperature Analysis."

- A reactor power level of 102% rated thermal power (RTP), 2429 MWt, in accordance with the guidance provided in Regulatory Guide 1.49.

- A RHR heat exchanger heat removal factor (represented by a single numerical factor, K) was used to allow for increased tube plugging. The K factor is defined to be the total heat exchanger heat removal rate divided by the difference between the two heat exchanger inlet temperatures (i.e., suppression pool and SW temperatures). A conservative K factor of 177 Btu/sec-°F was used.

- Initial SW and suppression pool temperatures of 90°F and 95°F, respectively, as discussed in Sections 3.2 and 3.3 above.

The following conservative assumptions, in addition to those assumed in the initial licensing analysis, were used:

- A conservative quantity of feedwater in the system that was at a temperature greater than the bulk suppression pool temperature was added to the vessel, and

- 100% of the ECCS pump work, converted to heat, was included.

The RHR and CS NPSH margins were shown to be greater than 3 and 6 psi, respectively. The results of this analysis were approved by CNS under 10CFR 50.59 and incorporated into the USAR.

3.5 Debris Loading on ECCS Strainers

NRC Bulletin 96-03 indicated that a revised ECCS strainer loading, in a post LOCA condition, should be considered in the calculation for ECCS pump NPSH. In 1997, CNS installed new strainers to meet the revised loading considerations under 10CFR 50.59 on the basis that the 3 psi and 6 psi margins were maintained, although added containment overpressure was required. This increased reliance on containment overpressure is included in this license amendment and discussed further in Section 4.3.

3.6 Generic Letter 97-04 and Responses

On October 7, 1997, the NRC issued Generic Letter (GL) 97-04, "Assurance of Sufficient Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal Pumps." A listing of CNS and NRC correspondence on this topic is included in Section 6 of this attachment. In Generic Letter 97-04, the NRC requested that licensees submit information necessary to confirm the adequacy of the NPSH available for the ECCS and containment heat removal pumps. At CNS, the RHR pumps perform both the ECCS and containment heat removal functions. In January 1998, CNS responded to the specific questions. In August 1998, the NRC noted that they had reviewed the CNS response to GL 97-04 and had a concern that CNS may not be within its licensing basis because the contribution now required (per the "1993 analysis" discussed in Section 3.4 and provided in Reference (3) of Section 6.0) from containment overpressure to

assure adequate ECCS NPSH was greater than that previously reviewed and approved by the NRC. CNS responded in September 1998 that, although it is true that a larger contribution is presently required for adequate NPSH, the margins of 3 psi and 6 psi stated in the AEC SER have been maintained and, therefore, CNS is within its design and licensing basis.

The NRC responded to CNS in November 1998 and noted that they did not agree with the CNS conclusion that the plant was within its licensing basis with respect to the ECCS NPSH concern. The NRC detailed in an attachment to the November 1998 letter their reasons for their disagreement, which are summarized as follows:

- Although the AEC SER only noted the containment overpressure margins, the response to the FSAR Q&A 6.4 did provide a series of curves showing the actual magnitude of the contribution required. Thus, this amount of containment overpressure contribution to ECCS NPSH is part of the CNS licensing basis.

- The use of the ANS 5.1 decay heat curve (without a two sigma uncertainty) in the current analysis was a change from the May-Witt model last reviewed by the NRC.

- The SW temperature assumed in the current analysis was 90°F versus the 84°F value used in the last analysis reviewed by the NRC (Amendment 82) and the resulting peak pool temperature for the current analysis was 196°F versus 184°F. The NRC stated that was indicative of different containment models being used to analyze the maximum pool temperature.

- The reactor power level used in the current analysis was 102% RTP versus the 104% RTP used in the Amendment 82 analysis.

Based on the above, the NRC concluded that CNS is outside its licensing basis with respect to containment overpressure contribution to ECCS pump NPSH. The NRC also noted that the latter three items indicate an unreviewed change in methodology. In response, NPPD agreed to submit a license amendment which would address the above issues, and in addition, would address the short-term CS pump NPSH issue (see Section 3.7 below) and the effect of the debris loading discussed in NRC Bulletin 96-03.

3.7 Short-term CS Pump NPSH Concern

In late 1998, NPPD determined that the previously calculated maximum CS pump runout flow of 6100 gpm, based on pre-operational test data, was in error due to an inadequate flow meter used in the pre-operational testing. The correct maximum possible CS pump runout, as determined by NPPD calculation, is 6525 gpm. In the event of a LOCA, this flow could continue for 10 minutes into the event since no credit can be assumed for operator action for the first 10 minutes of the event. Current analyses indicate there is not sufficient NPSH for the CS pumps at a flow rate of 6525 gpm without assuming some credit for containment overpressure. Previous submittals to the NRC have not included credit for containment overpressure in the first

10 minutes of the event. An analysis of the required and available overpressure in the short-term is discussed in section 4.4.

An Operability Evaluation (OE) was performed following the guidelines of Generic Letter 91-18, Revision 1. This OE demonstrates that the CS pumps are operable, although nonconforming, and that they are therefore capable of fulfilling their safety function as required.

3.8 Increase in Ultimate Heat Sink (UHS) Temperature

As indicated above, NPPD agreed to submit a license amendment request for approval of the current licensing basis, including both the short-term CS pump NPSH issue and the effect of the debris loading discussed in NRC Bulletin 96-03. Such a license amendment request was submitted (the "1999 analysis" submitted in Reference (9) of Section 6.0) but subsequently withdrawn when an error was discovered in the modeling of the control rod drive flow.

NPPD has determined that it is prudent to submit as part of the license amendment request a re-analysis of the containment response and NPSH calculations using assumptions that would be supportive of an anticipated license amendment request to increase the TS limit for the UHS (which provides the SW) temperature from 90°F to 95°F. The 90°F limit has been approached in recent years and, under severe conditions, river temperature above 90°F would require a plant shutdown during a period when peak generation may be required.

4.0 EVALUATION

This section provides a discussion of the current analysis which is provided in the Enclosures to support this amendment. Sections 4.1, 4.2, and 4.3 discuss the revised assumptions and methodology. Sections 4.4 and 4.5 provide the short term and long term results. Section 4.6 provides information regarding the evaluation of secondary line breaks to determine the bounding event.

4.1 Effect of Two Sigma Decay Heat Uncertainty and Higher UHS Temperature

To demonstrate that adequate ECCS pump NPSH is maintained following a large break LOCA, NPPD performed an NPSH containment analysis (Enclosure 3) using the SHEX computer code. Use of the SHEX computer code was endorsed by NRC in a letter from A. Thadani to G. Sozzi (GE) dated July 13, 1993, "Use of SHEX Computer Program and ANSI/ANS 5.1-1979 for Containment Long-term Pressure and Temperature Analysis." The NRC established conditions for use of SHEX require a benchmark study. Included as Appendix A to the analysis contained in Enclosure 3 is the CNS benchmark study for SHEX-04V computer code. This benchmark study is based on the FSAR Section XIV-6.3 Case C analysis reviewed during original plant licensing. Case C assumed operation of one RHR cooling loop with 1 RHR pump, two SW pumps and two RHRSWB pumps, and 1 RHR heat exchanger operating in containment spray mode. The assumptions and results of this study are explained in Appendix A of Enclosure 3. The results of this study demonstrate that the SHEX model for long-term containment response

provides comparable results to the calculation model used in the original FSAR and is conservative with respect to suppression pool temperature response.

The NPSH containment analysis contained in Enclosure 3 includes the following assumptions:

- An initial drywell temperature of 160°F, which is a conservative assumption since it will result in a lower maximum containment pressure. This is conservative with respect to the current TS 3.6.1.5 limit of 150°F and was chosen to address any instrument uncertainty concerns related to measurement of drywell temperature. This is a conservative change from the 1993 and 1999 analyses (References (3) and (9), respectively, of Section 6.0) which used the 150°F TS limit.

- An initial drywell pressure of zero psig since a reduced initial containment pressure (TS 3.6.1.4 allows 0.75 psig) will result in a lower containment pressure following the LOCA (and minimize the available containment overpressure). This is the same conservative assumption used in the initial licensing analysis, and also used in the 1993 and 1999 analyses.

- A constant post accident containment leak rate of 5% per day for the nominal long-term design flow rate case, which is almost a factor of eight higher than allowed by TS 5.5.12.c and 10CFR Part 50 Appendix J testing at the peak accident pressure. This has the effect of lowering the non-condensibles in the containment which will also reduce the peak containment pressure post LOCA. This is the same conservative assumption used in the initial licensing analysis, and also used in the 1993 and 1999 analyses. Bounding flow cases were also performed, but they use a constant containment leak rate of 0.635% per day (consistent with the TS maximum allowed containment leakage rate). This is also conservative since the maximum leakage rate is expected only at the containment peak post-accident pressure. A reduction in leakage rate is expected at reduced containment pressures, but is conservatively not considered in either the base case analysis or in the bounding flow case analyses.

- To maximize the suppression pool temperature following the LOCA, an initial suppression pool temperature of 100°F and a SW temperature of 95°F is assumed. Both of these values are greater than the maximum allowed by TS 3.6.2.1 and TS 3.7.2, respectively (in anticipation of potential future proposed TS changes). This differs from the initial licensing analysis, which assumed a maximum pool temperature of 90°F and a maximum SW temperature of 85°F. The values used in the 1993 and 1999 analyses used the current TS maximum allowed values of 95°F for the suppression pool and 90°F for the SW temperature.

- A "K" factor of 177 Btu/sec-°F was assumed. This is the same assumption used in the 1993 and 1999 analyses. Although not explicitly stated in the initial licensing analysis, the original process diagrams suggest the K factor was 228 Btu/sec-°F. This reduced K factor is conservative with respect to the initial licensing basis and is used to account for potential increases in the heat exchanger tube plugging.

- The loss of off-site power (LOOP) and the failure of one DG was assumed at the beginning of the event. This results in the availability of only one RHR containment cooling loop with one SW and one RHRSWB pump. For NPSH analysis, it is conservatively assumed that RHR is operating in the containment spray mode after 10 minutes, thus reducing the amount of overpressure available resulting in prediction of the lowest margins. This is the same conservative assumption used in the initial licensing analysis, and also used in the 1993 and 1999 analyses. Additionally, it is assumed that the CS pump is throttled to 4750 gpm after 10 minutes (as directed by station operating procedures) prior to initiating the RHR containment spray mode.

- The ANS 5.1-1979 decay heat model was used with a two sigma uncertainty addition. This is consistent with the 1999 analysis. This decay heat model is used assuming a core average exposure of 35,000 MWd/MT (amount of energy generated per unit metric-ton fuel mass) and a core irradiation time of four years. The model also accounts for additional actinides and activation products (as discussed in GE SIL 636) beyond those considered in previous CNS specific ANS 5.1 -1979 models. The delayed neutron capture ("G" factor) was adjusted to envelope the current and projected CNS cycles. This is a different decay heat model and delayed neutron capture model from that used in the initial licensing analysis and the 1993 analyses. The discussion of this revised decay heat model presented in Enclosure 2 indicates that the application utilizes a GE14 fuel type in order to determine the input parameters. However, the decay heat model is also applicable to other fuel product lines since decay heat evaluations are not very sensitive to the specific fuel type involved.

- The feedwater flow into the reactor vessel was adjusted to more accurately reflect the expected conditions. This revised model is consistent with the 1999 analysis and is based on the fact that the feedwater and condensate pumps will not be in operation following a LOCA/LOOP and only the water with a temperature above 212°F would be able to flow into the vessel with some of the water remaining in the feedwater piping and heaters. The initial licensing analysis did not discuss, and apparently did not include the effects of, feedwater addition. The 1993 analysis included an overly conservative assumption regarding the quantity and temperature of feedwater.

- The control rod drive (CRD) flow was assumed to be zero. The 1993 and 1999 long-term NPSH analyses included a non-conservative credit for CRD flow, which resulted in lower pool temperatures.

The results of this analysis indicate a peak suppression pool temperature of 207.8°F. This is approximately 12°F higher than predicted in the 1993 analysis. Elimination of CRD flow from the analysis accounts for approximately 3°F of this increase. The remainder of the increase is attributed to the revised decay heat and conservative assumptions to account for increased UHS and SW temperature and other containment parameters. This increase in the predicted suppression pool temperature results in the need for a greater reliance upon containment overpressure to conservatively demonstrate adequate ECCS pump NPSH.

4.2 Local Suppression Pool Temperature Limit

In a Safety Evaluation dated August 29, 1994, the NRC accepted a discussion of test data and analysis supporting deletion of the requirement to maintain the local suppression pool temperature below the saturation temperature of the pool during an SRV discharge. This safety evaluation discussion was provided in NEDO-30832-A entitled "Elimination of Limit on BWR Suppression Pool Temperature for SRV Discharge with Quenchers." The NRC evaluation concluded that the Boiling Water Reactor Owners Group (BWROG) had demonstrated in NEDO-30832 that unstable condensation oscillation loads are bounded by the air clearing hydrodynamic load when the "T" or "X" quenchers are used. The NRC evaluation raised an additional concern related to possible steam bubble or plume ingestion into ECCS pump suction piping. Due to the potential concern associated with steam bubble ingestion, CNS has performed an evaluation (Enclosure 4) of the likelihood of steam ingestion in the ECCS suction strainers during SRV actuation. CNS utilizes T quenchers at the discharge of the SRVs to avoid a condensation oscillation phenomenon which could result in extreme vibratory loadings on the containment structure. The steam bubble ingestion evaluation provided in Enclosure 4 conservatively considers the most limiting geometry, a saturated suppression pool and maximum SRV flow. The results show no ingestion of steam by the ECCS suction strainers is predicted. Thus, the local suppression pool temperature limit is unnecessary and is requested to be deleted from the CNS design basis.

4.3 Effect of New Debris Loadings

The analysis of the debris loading on the ECCS suction strainers utilizes a portion of the BWROG methodology presented in the NEDO-32686-A and addresses the effect of the debris loading discussed in NRC Bulletin 96-03. The CNS ECCS suction strainers were analyzed based on the following:

- Utilizing the "Zone of Influence" method described in NEDO-32686-A, a 28% destruction factor and 100% transport factor resulted in the worst case zone generating 75.3 lbs. of fibrous material and 20 lbs. of calcium silicate in the suppression pool. The 28% destruction factor is consistent with the NRC SER associated with NEDO-32686-A. Additionally, up to 12 million fibers are assumed to reside in the suppression pool prior to the event, which results in an assumed fiber mass of 75.4 lbs., used in the NPSH analysis.

- Other debris assumed available for loading on the strainers includes (in lbs.) 1200 for sludge, 150 for dirt/dust, 500 for paint chips, and 50 for rust. These are in accordance with the BWROG methodology, except for sludge and paint chips for which conservatively higher weights are utilized based on CNS evaluations.

- Reflective metal insulation (RMI) was conservatively excluded from the mix of debris types in accordance with the BWROG testing, which indicated that with CNS type of strainers (stacked disc) the head loss across the strainer would be reduced when RMI was included. Also, the original sizing calculations by the strainer vendor show that RMI loading alone is not limiting with respect to strainer head loss.

- Run-out flows of 6525 gpm for CS and 9240 gpm for RHR were assumed for the first 10 minutes of the accident. Throttled flows of 4750 gpm (per procedure) and 7700 gpm (per design) for CS and RHR, respectively, were assumed for the remainder of the event. The CS pump is assumed to be throttled prior to initiating RHR containment spray mode. (Note: A second RHR pump would also be operating during the first 10 minutes. The debris loading analysis assumes a low flow of zero gpm for this pump, to conservatively maximize the debris loading on the other two operating pumps).

- A portion of each strainers' surface area is assumed covered and is accounted for in determining the clean strainer head loss. This conservatism is equivalent to blocking approximately 4.5 sq. ft. of flow area for each strainer. This was done as a prudent measure to proactively address any potential operability concerns associated with potential foreign material exclusion breakdowns.

The cumulative effects of debris loading and changing suppression pool temperature during a DBA LOCA were analyzed utilizing the most recent NPSH analysis (Enclosure 1). The proposed USAR curve revisions (Attachment 3) show the containment response and pressure required to meet ECCS pump NPSH requirements.

4.4 Short-term CS Pump NPSH Results

As discussed above, the high run-out flow calculated for the CS pump, which is assumed to occur for the first 10 minutes, results in a need for crediting containment overpressure during the initial stages of the design basis accident LOCA. However, this run-out flow can only be achieved after the vessel has sufficiently depressurized. After depressurization, there will be adequate containment overpressure available to ensure reliable pump operation. An NPPD calculation (Enclosure 1) has determined the contribution required from containment overpressure in the first 10 minutes to assure adequate CS pump NPSH in the full runout condition. This calculation is based on the most recent containment response for NPSH (Enclosure 3) and shows there is at least a minimum margin between the required overpressure and the available overpressure of ~1.9 psi during the first 10 minutes. The CS pump is then assumed to be throttled prior to initiating the RHR containment spray mode for the long term cooling mode.

4.5 Long-term ECCS Pump NPSH Results

The NPSH analysis supporting this amendment request (Enclosure 1) assumes run-out flows for the first 10 minutes and design flow rates for the remaining accident period and shows that an increased reliance upon containment overpressure is required to maintain adequate ECCS pump NPSH. Approximately 6.5 psi and 5 psi containment overpressure is required for the RHR and CS pumps, respectively. At the peak suppression pool temperature, the minimum margin between available overpressure and required overpressure is at least 3 psi for RHR and 5 psi for CS (at approximately 36,700 seconds or 10.2 hours following event initiation). It should be noted that the 5 psi required overpressure for CS occurs at 600 seconds during run-out flow conditions. At the peak suppression pool temperature CS requires 4.5 psi overpressure.

The analysis also shows that just prior to 100 hours (at approximately 356,000 seconds) into the event, a minimum margin of ~0.6 psi is provided for ECCS pump NPSH. However, this minimum margin occurs at a point when no containment overpressure is required for ECCS pump NPSH. During times when containment overpressure is credited, there is a minimum of ~1 psi containment overpressure available. This latter minimum also occurs in the long term at approximately 300,000 seconds.

NPPD also performed sensitivity studies considering more limiting bounding case definitions accounting for instrument uncertainty and conservative conditions, which are extremely unlikely to occur simultaneously. Even under these unrealistic conditions, the sensitivity studies indicate sufficient margin between available overpressure and required overpressure is available throughout the event. Under these conditions and the design basis flow rate conditions the calculations show the minimum margin between available overpressure and required overpressure occur at extremely long-term durations (approximately 4 to 8 days after event initiation). These minimum margins occur when the containment pressure is near atmospheric pressure and operator actions are reasonably expected to control both pump flows and containment pressures to prevent any concerns related to inadequate NPSH.

4.6 High Pressure Coolant Injection (HPCI) and Non-DBA LOCAs

The information provided above encompasses the residual heat removal (RHR) and core spray (CS) pumps, but excludes the HPCI pump. While the HPCI pump can take suction from the suppression pool, the normal suction alignment is from the emergency condensate storage tanks (ECST). In addition, the HPCI system does not have an effect on the overall ECCS performance for a large break LOCA because the vessel depressurizes rapidly before the HPCI system has sufficient time to inject a significant amount of coolant into the vessel. For small break LOCA's, the CNS LOCA analysis takes no credit for HPCI operation because the limiting single failure (125 DC Power) prevents the HPCI system from initiating.

The ADS is provided to depressurize the reactor in the event that the HPCI system is not available or does not provide adequate cooling. Since the ADS is made up of multiple independent SRV's, it is single-failure proof and consequently, can be assumed to always be available. In the CNS LOCA analysis, credit was only taken for five of the six ADS valves. Reactor depressurization ensures that an adequate source of coolant will always be available by permitting the low pressure ECCS (i.e., CS and LPCI) to inject into the reactor vessel.

To address secondary line breaks, NPPD selected a small steam line break (SSLB) as representative for evaluation of NPSH. Various SSLB sizes were analyzed for potential impact on ECCS pump NPSH. The results of these analyses show that greater margin exists to ensure adequate NPSH than those reported for the DBA LOCA. This is due to less debris loading and less ECCS flow demand required for small breaks. HPCI was analyzed for these scenarios assuming suction from the suppression pool, although normally aligned to the ECSTs. The analysis shows that the ECCS pumps have adequate margin between available containment pressure and required containment pressure to ensure sufficient NPSH to perform their safety functions.

Therefore, adequate NPSH is also assured for the analyzed non-DBA LOCA events as well as the DBA LOCA event, including the HPCI pump.

5.0 SUMMARY OF RESULTS

There is no additional impact on the health and safety to the public as a result of this proposed change. Conservative assumptions are utilized to calculate the containment overpressure available for ECCS pump NPSH requirements. The strainer head loss due to debris loading is conservatively estimated and the resulting required overpressure is met by the containment response. There is adequate margin available to address potential uncertainties and to ensure the ECCS pumps will be capable of performing their required safety function. Table 1 summarizes the results of the design basis definition calculation, showing the available containment overpressure and the required CS and RHR pump overpressure for various times and suppression pool temperatures. Table 2 summarizes the margins between the available containment overpressure and the required CS and RHR pump overpressure for various times and suppression pool temperatures.

Although there is an increased reliance on containment overpressure (above that considered for the original license application analysis), adequate low pressure ECCS pump NPSH is assured, and sufficient margin is conservatively determined to be maintained between the available overpressure and the required overpressure to provide confidence that the ECCS pumps will operate as required.

The revised calculations show the absolute containment overpressure available increases from ~5 psi (original license application) to ~9.5 psi at the time of the peak suppression pool temperatures following a design basis LOCA. At this containment overpressure, the CS and RHR pumps will utilize ~4.5 psi and ~6.5 psi, respectively, of the available overpressure. This provides a margin of ~5 psi and ~3 psi, respectively, for the CS and RHR pumps at the peak suppression pool temperature.

The calculations also address both short-term and long-term reliance on containment overpressure. In the short-term (<600 seconds), the RHR pumps do not depend on containment overpressure for adequate NPSH. However, during this short-term period following initiation of the event, the CS pump is conservatively calculated to require ~5.0 psi of containment overpressure to assure adequate NPSH. At the time this overpressure is needed, ~6.9 psi of containment overpressure is available, providing a margin of ~1.9 psi. For the time periods following the peak suppression pool temperature, the required overpressure reliance reduces with time and suppression pool temperature.

A minimum margin of ~0.6 psi is provided for ECCS pump NPSH. However, this minimum margin occurs in the long-term (just prior to 100 hours into the event) at a point when no containment overpressure is required for ECCS pump NPSH. During times when containment overpressure is credited, there is a minimum of ~1 psi containment overpressure available.

CNS has also evaluated the quencher and strainer configurations within the suppression pool and determined that steam bubble ingestion is not predicted. This evaluation supports the elimination of the local suppression pool temperature limit.

Therefore, sufficient margin and adequate NPSH are demonstrated with the conservatism of a two sigma (two standard deviation) uncertainty in the decay heat model, increased suction strainer debris loading, increased RHR heat exchanger tube plugging margin, and increases in SW and suppression pool temperatures. Thus, the proposed activity does not involve a significant reduction in a margin of safety.

Table 1- Containment Overpressure NPSH Requirements for the Design Basis Case

TIME (approximate) (seconds)	SUPPRESSION POOL TEMPERATURE (°F)	CS PUMP REQUIRED OVERPRESSURE (psi)	RHR PUMP REQUIRED OVERPRESSURE (psi)	CONTAINMENT (WETWELL) OVERPRESSURE AVAILABLE (psi)
0	100	Not running	Not running	0
600	161	4.94	Not required	6.85
1000	167	Not required	Not required	3.39
10,100	195.4	1.49	3.52	7.62
36,700	207.8	4.44	6.47	9.48
100,050	195.2	1.54	3.56	6.15
297,100	173.7	Not required	0.02	1.04
299,400	173.5	Not required	Not required	1.00
356, 130	168.6	Not required	Not required	0
1,000,000	147.5	Not required	Not required	0

Table 2- Containment Overpressure NPSH Margins for the Design Basis Case

TIME (approximate) (seconds)	SUPPRESSION POOL TEMPERATURE (°F)	CS PUMP OVERPRESSURE MARGIN (psi)	RHR PUMP OVERPRESSURE MARGIN (psi)	CONTAINMENT (WETWELL) OVERPRESSURE AVAILABLE (psi)
0	100	Not running	Not running	0
600	161	1.91	7.63	6.85
1000	167	7.65	5.54	3.39
10,100	195.4	6.13	4.10	7.62
36,700	207.8	5.04	3.01	9.48
100,050	195.2	4.61	2.59	6.15
297,100	173.7	3.02	1.02	1.04
299,400	173.5	3.00	1.00	1.00
356, 130	168.6	2.60	0.61	0
1,000,000	147.5	4.30	2.36	0

6.0 CNS GENERIC LETTER 97-04 DOCKETED CORRESPONDENCE

(1) NRC Generic Letter 97-04, "Assurance of Sufficient Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal Pumps," dated October 7, 1997.

(2) Letter (NLS970192) from G. R. Horn (NPPD) to U.S. NRC, dated November 4, 1997, "Response to NRC Generic Letter 97-04."

(3) Letter (NLS970226) from G. R. Horn (NPPD) to U.S. NRC, dated January 5, 1998, "Response to NRC Generic Letter 97-04."

(4) Letter from U.S. NRC to G. R. Horn (NPPD), dated August 14, 1998, "Request for Additional Information Related to Generic Letter 97-04 - Cooper Nuclear Station (TAC No. M99978)."

(5) Letter (NLS980149) from M. F. Peckham (NPPD) to U.S. NRC, dated September 22, 1998, "Response to NRC Generic Letter 97-04, Request for Additional Information."

(6) Letter from U.S. NRC to G. R. Horn (NPPD), dated November 24, 1998, "CNS Response to Request for Additional Information Pertaining to Generic Letter 97-04."

(7) Letter (NLS980201) from J. H. Swailes (NPPD) to U.S. NRC, dated December 23, 1998, "Response to NRC Generic Letter 97-04 Request for Additional Information."

(8) Letter (NLS990042) from J. H. Swailes (NPPD) to U.S. NRC, dated April 30, 1999, "Revision of Commitment Made in Response to NRC Generic Letter 97-04, Request for Additional Information."

(9) Letter (NLS990052) from J. H. Swailes (NPPD) to U.S. NRC, dated June 15, 1999, "Proposed License Amendment, Containment Overpressure Contribution to ECCS Pump NPSH Requirement Post LOCA."

(10) Letter (NLS990080) from L. Newman (NPPD) to U.S. NRC, dated August 24, 1999, "Proposed License Amendment, Containment Overpressure Contribution to ECCS Pump NPSH Requirement Post LOCA, Response to Request for Supporting Documentation."

(11) Letter (NLS2000060) from J. H. Swailes (NPPD) to U.S. NRC, dated June 14, 2000, "Withdrawal of Proposed License Amendment, Containment Overpressure Contribution to ECCS Pump NPSH Requirement Post LOCA."

(12) Letter (NLS2000099) from J. H. Swailes (NPPD) to U.S. NRC, dated November 14, 2000, "Revision of Commitment Made to Resolve NRC Generic Letter 97-04 Issues."

(13) Letter (NLS2001053) from J. H. Swailes (NPPD) to U.S. NRC, dated May 30, 2001, "Revision of Commitment Made to Resolve NRC Generic Letter 97-04 Issues."

7.0 OTHER DOCKETED REFERENCES

(1) AEC Safety Evaluation Report dated February 14, 1973.

(2) CNS FSAR Question 6.4 (Amendment 11).

LICENSE AMENDMENT REQUEST
USAR REVISIONS RELATED TO
REVISION OF ECCS PUMP NPSH ANALYSIS

COOPER NUCLEAR STATION
NRC DOCKET NO. 50-298, LICENSE DPR-46

Insert "A" for Chapter VI: (USAR Page VI-5-16)

1. The reactor is initially at 102 percent of rated thermal power per Regulatory Guide 1.49. The ANS 5.1 decay heat model is used assuming an exposure of 35,000 MWd/MT (amount of energy generated per unit metric-ton fuel mass) and a core average time at power of 4 years. The ANS 5.1 decay heat model used includes two sigma uncertainty adder and accounts for additional actinides and activation products[66].

Insert "B" for Chapter VI: (USAR Page VI-5-16):

7. During the event, the portion of feedwater in the feedwater system that is at a temperature higher than 212°F after absorbing additional energy from the feedwater piping as it flows toward the vessel is injected into the vessel. This hot portion of the feedwater inventory is transferred to the vessel regardless of the availability considerations of feedwater and condensate pumps.

Insert "C" for Chapter VI: (USAR Page VI-5-16)

9. An RHR heat exchanger K-value of 177 Btu/sec-°F is used, consistent with the minimum thermal capability of a single RHR heat exchanger operating in containment spray mode.

Insert "D" for Chapter VI: (USAR Page VI-5-16)

Use of containment sprays is conservative for ECCS NPSH analysis, since containment spray mode results in slightly higher suppression pool temperature and lower containment pressure.

Insert "E" for Chapter VI: (USAR Page VI-5-17)

15. Fibrous and miscellaneous containment debris loading is included in accordance with NRC Bulletin 96-03 and Boiling Water Reactor Owners Group (BWROG) methodologies[60][61][67].

16. A flow blockage area of greater than 4.5 sq. ft. is assumed for each strainer in determining clean strainer head-loss.

Insert "F" for Chapter VI: (USAR Page VI-5-17):
Analysis assumptions 15 and 16 result in minimized flow area for the ECCS pump suction inlets from the suppression pool.

Insert "G" for Chapter VI: (USAR Page VI-5-17):
Additional sensitivity cases were analyzed to explicitly account for instrument uncertainty and provide bounding case definitions, which are extremely unlikely to occur simultaneously. Even under these improbable conditions, the conservative calculations indicate sufficient margin between available overpressure and required overpressure is available throughout the entire event.

Insert "H" for Chapter VI: (USAR Page VI-5-17):
Evaluation has shown that steam bubble ingestion is not a concern for ECCS pumps due to the arrangement of the quenchers and the suction strainers in the suppression pool[68][69].

Insert "I" for Chapter VI: (USAR Page VI-7-3):

64. NEDC 94-034B, "Acceptance of Containment System Response for NPSH Analysis, GE-NE-T23-00786-00-01," May 2001.

65. NEDC 99-009, "Decay Heat Evaluation, Review of GE Report GE-NE-E1200141-04," May 2001.

66. GE Service Information Letter (SIL) 636, "Additional Terms Included in Reactor Decay Heat Calculations," May 24, 2001.

67. NEDO-32686-A, "Utility Resolution Guidance for ECCS Suction Strainer Blockage," October 1998.

68. NEDO-30832, "Elimination of Limit on BWR Suppression Pool Temperature for SRV Discharge with Quenchers," December 1984.

69. NEDC 94-034I, "Acceptance of Evaluation of Steam Ingestion in the Emergency Core Cooling System (ECCS) Suction Strainers, GE NE-T23-00786-00-09, dated June 2001.

Insert "J" for Chapter VI: (New Figures)
New Figure VI-5-15, Available and Required Overpressure for ECCS NPSH (0 - 1000 seconds), and new Figure VI-5-16, Available and Required Overpressure for ECCS NPSH (1000 sec - 10^6 seconds).

Insert "K" for Chapter V: (USAR Page V-2-61):

2.4.10 Suppression Pool Local Temperature Limitations

Section 7 of the CNS Plant Unique Analysis Report describes the pool temperature evaluation performed in 1982 to show conformance to NRC limitations identified in NUREG-0783, i.e., a local suppression pool temperature limit of 200 °F. By letter dated August 29, 1994[110], the NRC transmitted to the Boiling Water Reactor Owners Group (BWROG) the NRC Safety Evaluation of the General Electric (GE) report NEDO-30832 titled "Elimination of Limit on BWR Suppression Pool Temperature for SRV Discharge with Quenchers." NEDO-30832[111] presents a discussion of test data and an analysis which supports deletion of the requirement to maintain the local suppression pool temperature below the saturation temperature of the pool during an SRV discharge. The NRC evaluation of NEDO-30832 concluded that the local suppression pool temperature limit may be eliminated if suppression pool discharges are delivered to the suppression pool through a "T" or an "X" quencher device, and if the ECCS suction piping is below the quencher elevation. The evaluation also indicated that NEDO-30832 was acceptable for reference in future licensing actions when the conditions for its applicability are met.

CNS has since performed an evaluation of the likelihood of steam ingestion in the ECCS suction strainers during SRV actuation. CNS utilizes T quenchers at the discharge of the SRVs to avoid a condensation oscillation phenomenon which could result in extreme vibratory loadings on the containment structure. Along with the quenchers, CNS imposed local suppression pool temperature limits to assure prevention of steam ingestion in the ECCS suction strainers. The evaluation conservatively considers the most limiting geometry, a saturated suppression pool and maximum SRV flow. The results show no ingestion of steam by the ECCS suction strainers. Thus, the local suppression pool temperature limit is not required and has been deleted from the CNS design basis[112].

Insert "L" for Chapter V: (USAR Page V-4-4):

110. Holahan, G. M., USNRC to R. P. Pinelli, Boiling Water Reactor Owners Group, "Transmittal of the Safety Evaluation of General Electric Company Topical Reports: NEDO-30382, entitled "Elimination of Limit on BWR Suppression Pool Temperature for SRV Discharge with Quenchers," and NEDO-31695 entitled "BWR Suppression Pool Temperature Technical Specification Limits," August 29, 1994.

111. NEDO-30832, "Elimination of Limit on BWR Suppression Pool Temperature for SRV Discharge with Quenchers," December 1984.

112. NEDC 94-034I, "Acceptance of Evaluation of Steam Ingestion in the Emergency Core Cooling System (ECCS) Suction Strainers," GE Report NE-T23-00786-00-09 dated June 2001.

Using the suppression pool as the source of water for the LPCI subsystem establishes a closed loop for recirculation of LPCI water escaping from the break. The LPCI and appropriate portions of the reactor recirculation loops are designed as Class I (see Appendix C) so that they meet design basis 8.

5.3 ECCS Pumps NPSH [27, 60]

The entire spectrum of possible operating modes of ECCS has been examined for adequacy with regard to NPSH at the various pumps. Adequate NPSH is available to the ECCS pumps for all the various modes of operation.

The most limiting of all the various modes occurs during the long term transient following a design basis LOCA when one CS and one RHR pump will be running continuously. Figures VI-5-15 and VI-5-16 are ~~16 18~~ plots of both the minimum containment pressure required for CS and RHR pumps to have adequate NPSH and a plot of the minimum containment pressure that would actually occur. At all times there would be at least a ~~2~~ 0.6 psi margin.

In order to demonstrate the margin inherent in Figures VI-5-15 and VI-5-16, the following is a list of the major assumptions used to calculate the suppression pool temperature and the minimum containment pressure following the design basis LOCA.[39]

INSERT A

~~1. The reactor is initially at 102 percent of rated thermal power per Regulatory Guide 1.49. The ANS 5.1 decay heat model is used assuming an exposure of 25,700 MWD/st (amount of energy generated per unit metric-ton fuel mass), which represents a high fuel burnup, and, therefore, a high decay power condition.~~

2. Offsite power is assumed lost at the initiation of the accident and is not restored during the entire event.

3. Only one onsite diesel generator is available during the entire event. Consequently, only one pump each for the Core Spray ~~(14,720 gpm)~~, LPCI/Containment Cooling ~~(17,700 gpm)~~, and RHR Service Water Booster System ~~(4,000 gpm)~~ is assumed to be available.

4. The power required to operate the core spray pump and LPCI/Containment Cooling pump is added to containment heat load by increasing water temperature at the pump discharge accordingly.

5. At the initiation of the accident, the suppression pool has the minimum water volume of 87,650 ft^3 and ~~the~~ is assumed at a maximum temperature of ~~95°F~~ 100°F.

6. The service water temperature remains at ~~90°F~~ 95°F throughout the event.

INSERT B

~~7. During the event, the portion of feedwater in the feedwater system that is higher in temperature than peak pool temperature is assumed to continue to return to the reactor vessel.~~

8. No heat loss from the primary containment to the reactor building airspace is assumed.

INSERT C

~~9. The minimum thermal capability specified in Table IV-8-1 is used for the RHR heat exchangers.~~

10. Containment ~~cooling~~ spray mode by the RHR heat exchanger is manually initiated at 600 seconds into the event.

INSERT D

11. The drywell bulk temperature is assumed to be ~~150°F~~ 160°F together with 100 percent humidity prior to the accident. Normal operating conditions would be 135°F with 20 percent humidity.

12. The initial containment pressure is 0 psig. Normal operating pressure could be as high as ~~1.5~~ 0.75 psig. There are no circumstances under which a sub-atmospheric pressure could exist in the containment.

13. A constant containment gas leakage rate of 5 percent per day is assumed. This is substantially higher than the allowed leakage rate of 0.635 percent per day at 58 psig (see Section V-2, "Primary Containment System").

14. The discharge from the RHR heat exchanger always returns to the suppression pool via the drywell and Suppression Chamber sprays to minimize the containment pressure by spraying cold water into the containment air space.

INSERT E

The result of assumptions 1 through 9 is to maximize the peak suppression pool temperature. With no offsite power and with one diesel-generator out of service the pool will be cooled by one RHR heat exchanger with one RHR and one SW pump. This, together with the maximum Service Water temperature, results in a peak pool temperature of ~~196°F~~ 207.8°F. The suppression pool is assumed to be the only heat sink even though the metal structures within the containment are capable of storing considerable energy. No credit is taken for any heat losses from the containment other than the energy being removed by the RHR heat exchanger.

Assumptions 11, 12, 13, and 14 result in the minimum possible quantity of non-condensible gases being present in the containment during the transient; which in turn results in the minimum possible pressure. ~~Assumption~~ 14 gives the minimum containment gas temperature and thus also minimized the pressure.

INSERT F

The combination of maximum fluid temperature and minimum containment pressure calculated with the above assumptions are the most severe conditions for which adequate NPSH must be shown to exist. Figures VI-5-15 and VI-5-16 show that adequate NPSH would indeed exist even under these very degraded circumstances.

INSERT G

It can be seen that there is a period during which the containment pressure must be in excess of atmospheric pressure if adequate NPSH is to be provided. The design basis for the ECCS for CNS does not include the requirements that they be functional with no containment back pressure.

These pumping systems were designed before Safety Guide No. 1 was proposed, and due to back pressure dependence do not strictly conform with Safety Guide No. 1. However, adequate NPSH is provided for the analyzed ~~all~~ conditions. The dependence on back pressure is justified by the conservative models used to calculate the minimum back pressure. In the incredibly remote event that other ~~all~~ ~~the~~ unlikely circumstances ~~assumed above~~ do indeed occur simultaneously for some reason and there is an accompanying loss of back pressure, the plant operator would always have recourse to the RHR/Service Water intertie.

~~Separate analyses were performed to demonstrate that local suppression pool temperatures are maintained below 200°F to ensure stable steam condensation.[34][35][40]~~

INSERT H

25. Deleted.

26. Deleted.

27. Q/A 6.4, Amend. 11.

28. Deleted

29. DC 83-001.

30. Deleted.

31. Deleted.

32. Deleted.

33. Deleted.

34. ~~Cooper Nuclear Station - Plant Unique Analysis Report Mark I Containment Program.~~ Deleted.

35. ~~Cooper Nuclear Station - Suppression Pool Temperature Response NEDC-24360-P.~~ Deleted.

36. DC 90-283, Amendment 1.

37. General Electric Report EAS-019-0489, July 1989, Evaluation of Reducing Reactor Water Level 3 Setpoint for Cooper Nuclear Station.

38. NRC SER for CNS Technical Specifications Amendment 88, September 21, 1984.

39. General Electric Report GENE-637-045-1293, Containment Analyses in Support of an Increase in the RHRS Heat Exchanger Tube Plugging Margin for Cooper Nuclear Station, January 1994.

40. ~~General Electric Report GENE-673-020-0993, Evaluation of RHR Heat Exchanger Tube Plugging Margin for Cooper Nuclear Station, October 1993.~~ Deleted.

41. NEDC 94-176.

42. Design Change (DC 94-250).

43. B. S. Shiralkar, et. al., "The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident," NEDE-23785-P-A, Volumes I, II, and III, February 1985.

44. A. J. Lipps, "Cooper Nuclear Station SAFER/GESTR-LOCA Loss-of-Coolant Analysis," NEDC-32687P, March 1997.

45. Letter, R. L. Gridley (GE) to D. G. Eisenhut (NRC), "Review of Low-Core Flow Effects on LOCA Analysis for Operating BWRs - Revision 2," May 8, 1978.

46. Letter, D. G. Eisenhut (NRC) to R. L. Gridley (GE), "Safety Evaluation Report on Revision of Previously Imposed MAPLHGR (ECCS-LOCA) Restriction for BWRs at Less Than Rated Core Flow," May 19, 1978.

47. NRC Safety Evaluation of the CNS Response to the Station Blackout Rule dated August 22, 1991.

48 NRC Supplemental Safety Evaluation of the CNS Response to the Station Blackout Rule dated June 30, 1992.

49. NRC Supplemental Safety Evaluation and Closeout of Staff Review of the CNS Response to the Station Blackout Rule dated November 19, 1992.

50. Enercon Services Report NPP1-PR-01, "Station Blackout Coping Assessment for Cooper Nuclear Station," Rev. 2, June 1993.

51. NEDC 91-157.

52. DC 95-036.

53. Deleted.

54. NEDC 92-100.

55. Deleted.

56. Q/A 6.7 Amendment 9.

57. Q/A 6.12 Amendment 14.

58. CNSR766339 LPCI Injection Valve Damage due to Excessive Differential Pressure.

59. LER 95-13, HPCI Operation during SBO.

60. NEDC 97-~~044.~~ 044A.

61. NRC Bulletin 96-03, Suction Strainer Clogging.

62. "GE14 Fuel Design Cycle-Independent Analyses for Cooper Nuclear Station," Revision 0, NEDC-32914P, February 2000.

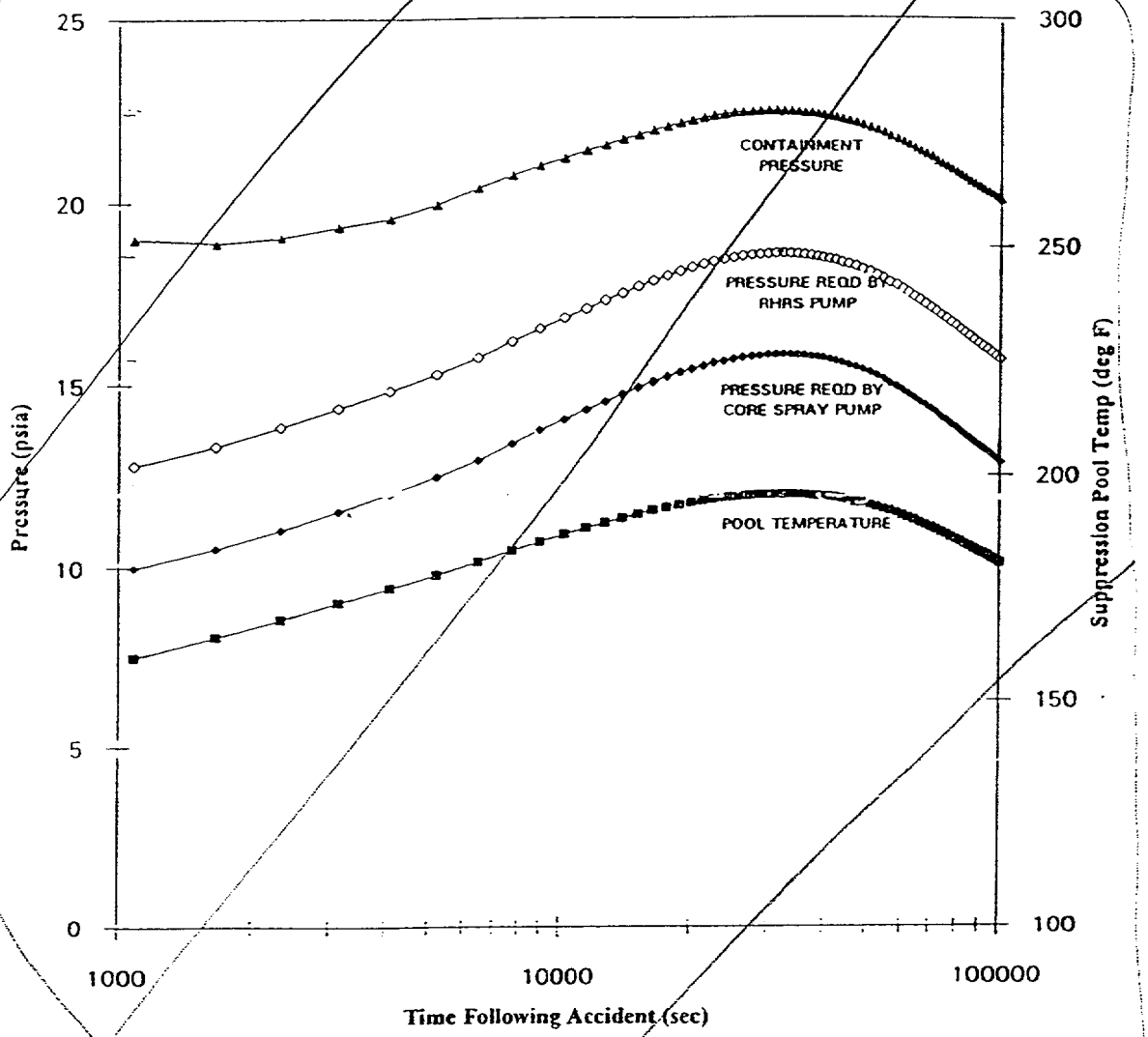
63. "Maximum Extended Load Line Limit and Increased Core Flow for Cooper Nuclear Station," Revision 0, NEDC-32914P, January 2000.

INSERT I

LIST OF FIGURES

(At end of Section VI)

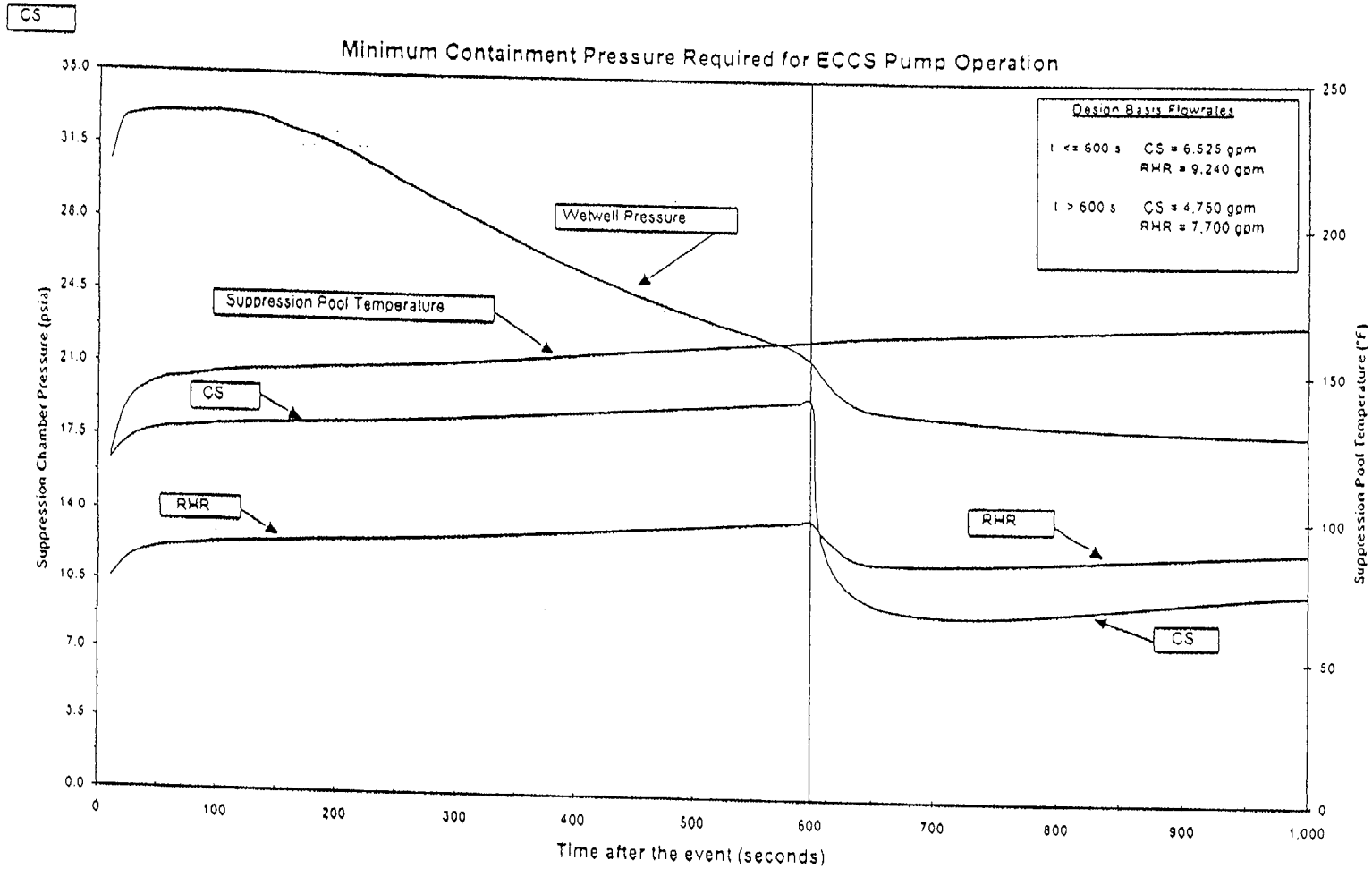
Figure No.	Title
VI-5-1	Water Level Following a Recirculation Line Suction Break, DC Power Failure, 80% DBA
VI-5-2	Pressure Following a Recirculation Line Suction Break, DC Power Failure, 80% DBA
VI-5-3	Temperature Following a Recirculation Line Suction Break, DC Power Failure, 80% DBA
VI-5-4	Heat Transfer Coefficient Following a Recirculation Line Suction Break, DC Power Failure, 80% DBA
VI-5-5	ECCS Flow Following a Recirculation Line Suction Break, DC Power Failure, 80% DBA
VI-5-6	Water Level Following a Recirculation Line Discharge Break, DC Power Failure, 1.0 ft^2
VI-5-7	Pressure Following a Recirculation Line Discharge Break, DC Power Failure, 1.0 ft^2
VI-5-8	Temperature Following a Recirculation Line Discharge Break, DC Power Failure, 1.0 ft^2
VI-5-9	Heat Transfer Coefficient Following a Recirculation Line Discharge Break, DC Power Failure, 1.0 ft^2
VI-5-10	Flow Rate Following a Recirculation Line Discharge Break, DC Power Failure, 1.0 ft^2
VI-5-15	Minimum Containment Pressure for Operation of ECCS Pumps (0-1000 seconds)
VI-5-16	Minimum Containment Pressure for Operation of ECCS Pumps (1000-10^6 seconds)



INSERT J

Nebraska Public Power District
COOPER NUCLEAR STATION
UPDATED SAFETY ANALYSIS REPORT (USAR)

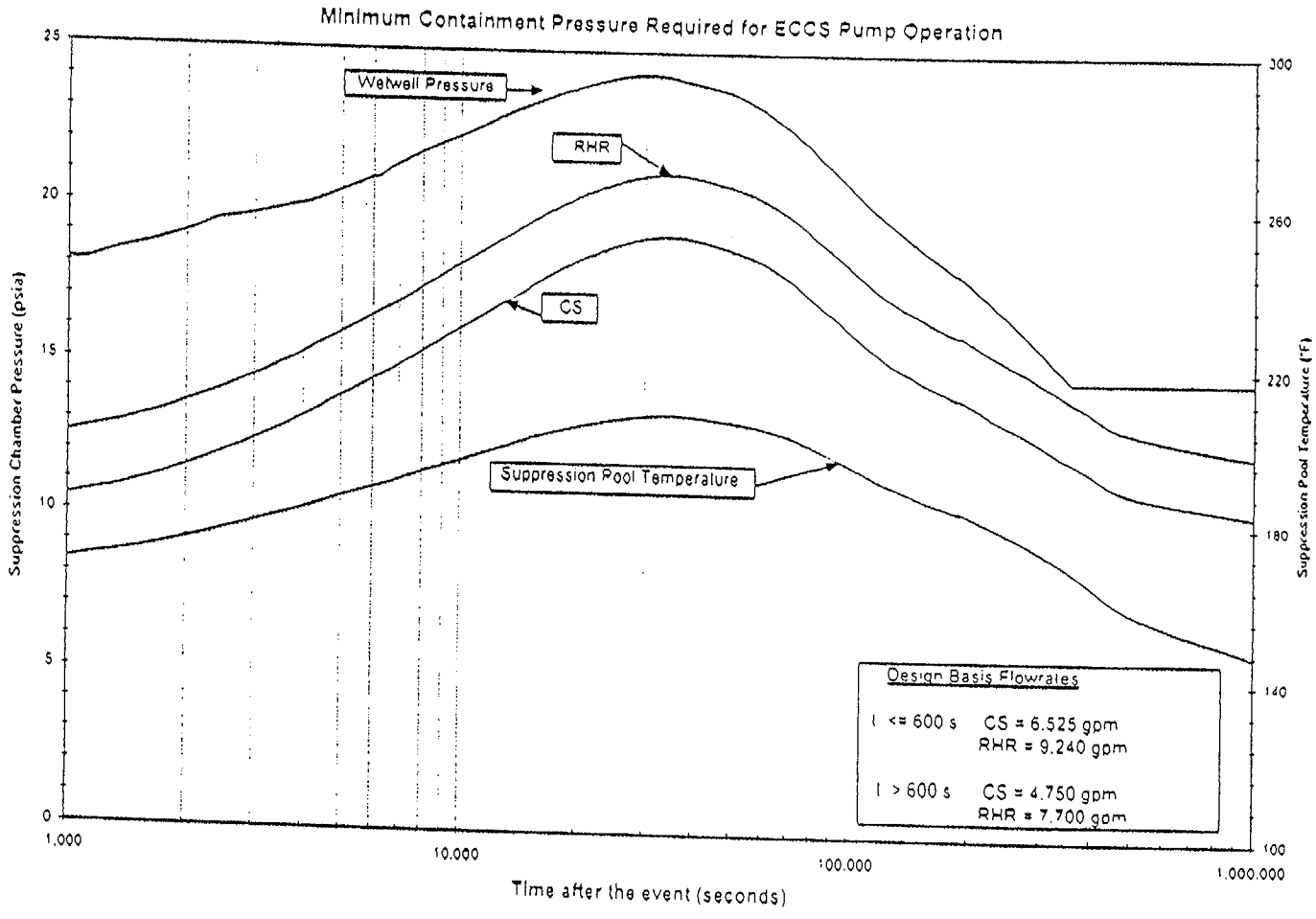
Minimum Containment Pressure for Operation of ECCS Pumps
Figure VI-5-15
07/22/94



Note: Core Spray pumps initially require containment overpressure due to high run-out flows. See reference (60) for other sensitivity cases.

Nebraska Public Power District
Cooper Nuclear Station
Updated Safety Analysis Report (USAR)

Minimum Containment Pressure
For Operation of ECCS Pumps
Figure VI-5-15



Note: These curves represent the "design case" required overpressure for CS and RHR. See reference (50) for other sensitivity cases.

Nebraska Public Power District
Cooper Nuclear Station
Updated Safety Analysis Report (USAR)

Minimum Containment Pressure
For Operation of ECCS Pumps
Figure VI-5-16

that are assumed for initial values in the "Station Safety Analysis" in Section XIV.

2.3.10.1 Suppression Pool Water Temperature[2], [102]

Sixteen separate sensing devices divided into two divisions and a recorder for each division are installed to monitor suppression pool water temperature. The recorders are installed in the control room.[80] Indication is also provided in the Alternate Shutdown Room as discussed in Section VII-18, "Alternate Shutdown Capability."

~~As a part of the Mark I Containment Program, analyses have been performed to ensure that local suppression pool temperatures are maintained below 200°F to ensure stable steam condensation.[66]~~

2.3.10.2 Suppression Chamber Water Level[21]

Suppression Chamber water level is indicated and recorded in the main control room from two separate level transmitters. Range of indication is from -4 feet to +6 feet of vessel centerline with an accuracy of ± 3.0% of span. Normal water level is 1' 7 1/2" below vessel centerline. Range of recording is from -4 feet to +6 feet with an accuracy of ± 3% of span.[82] Indication is also provided in the Alternate Shutdown Room as discussed in Section VII-18, "Alternate Shutdown Capability."

The Suppression Chamber level indication system uses the instruments identified in Table V-2-6.[23] This instrumentation includes two narrow range channels and one wide range channel.[25,26]

Instrumentation used to initiate the transfer of the HPCI system suction upon high suppression pool water level is discussed in Section VII-4, "Emergency Core Cooling Systems Control and Instrumentation."

2.3.10.3 Primary Containment Water Level[69]

Primary Containment water level is redundantly monitored by narrow and wide range instruments in each RPS division and recorded in the Main Control Room. The narrow range instruments are used to monitor water level in the suppression pool. The narrow range instruments provide water level measurements in the suppression pool with a range of 0-30 feet. The wide range instruments are used to monitor water level in both the suppression pool and the drywell. The wide range instruments provide water level measurements in the suppression pool and the drywell with a range of 0-100 feet. The Primary Containment water level instrumentation is in conformance with NUREG-0737 Item II.F.1-5.

2.4.8 Suppression Pool Water Storage

Based upon the "Station Safety Analysis" presented in Chapter XIV, the quantity of water stored in the suppression pool is sufficient to condense the steam from a design basis accident and to provide water for the Emergency Core Cooling Systems. As is discussed in Appendix C, Section C-2.5.7.1.6, the dynamic analysis of the suppression chamber considers the effects of the mass of suppression pool water.

It is concluded that safety design basis 7 is met.

2.4.9 Limitations During Planned Operations

As is discussed in Sections V-2.3.6, V-2.3.7, and V-2.3.8 Primary Containment is designed to be kept within the limits of parameters assumed in the "Station Safety Analysis" presented in Section XIV during planned operations.

It is concluded that safety design basis 8 is met. INSERT K

2.5 Inspection and Testing

The following discussion details the surveillance and testing that is conducted on the various systems or components of the primary containment during station operation. Surveillance and testing during station operation is detailed in Section 3.6 of the Technical Specifications (Reference 28).

2.5.1 Primary Containment Integrity and Leak Tightness

This USAR section contains historical information as indicated by the italicized text. USAR Section I-3.4 provides a more detailed discussion of historical information. The information being presented in this section as historical has been preserved as it was originally submitted to the NRC in the CNS FSAR.

Fabrication procedures, nondestructive testing and sample coupon tests were made in accordance with the ASME Code of Boilers and Pressure Vessels, Section III, Subsection B. The integrity of the primary containment system was verified during construction. The verification included a pneumatic test of the drywell and suppression chamber at 1.25 times their design pressure in accordance with code requirements.

Preoperational Type-A Primary Containment Integrated Leak Rate Tests (ILRT's) were performed on the containment structure in October, 1973. Leakage rates were measured at the calculated peak design basis accident pressure of 58 psig and at a reduced pressure of 29.9 psig. Tests were conducted in accordance with 10CFR50, Appendix J - 1973 and ANSI N45.4 - 1972. Test methods and results are summarized in "Reactor Containment Building Integrated Leak Rate Test," October, 1973.

The following details apply to surveillance and testing during station operation:

The interior surfaces of the Drywell and Suppression Chamber including water line regions shall be visually inspected each refueling outage cycle for evidence of Drywell or Suppression Chamber corrosion or leakage.

Each Reactor Building-to-Suppression Chamber vacuum breaker shall be inspected and verified to meet design requirements during each refueling outage.

ILRT's are periodically performed to verify Primary Containment operability. Surveillance requirements for ILRT's are set forth in Section 3.6.1.1 of the Technical Specifications.

53. Deleted.

54. Deleted.

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57. Deleted.

58. Deleted.

59. Deleted.

60. Deleted.

61. Deleted.

62. Deleted.

63. Deleted.

64. Deleted.

65. Deleted.

66. ~~NUREG 0661, Mark I Containment Long Term Program, Safety Evaluation Report, July, 1980.~~ Deleted.

67. MDC 80-03.

68. MDC 80-055.

69. MDC 80-116.

70. Deleted.

71. Deleted.

72. Deleted.

73. Deleted.

74. Deleted.

75. Deleted.

76. Deleted.

77. Deleted.

78. Deleted.

79. IER 84-20.

80. DC 85-108.

81. NRC Safety Evaluation Report (SER) for CNS Technical Specification Amendment 91, dated May 13, 1985.

82. CNS Technical Specifications Amendment 7, February 6, 1975.

83. Safety Evaluation Report for CNS Technical Specification Amendment 50, July 10, 1978.

84. Q/A 9.12, Amendment 11.

85. MDC 84-124.

86. Q/A 9.13, Amendment 9.

87. Q/A 9.10, Amendment 13.

88. Q/A 9.18, Amendment 15.

89. Q/A 9.14, Amendment 9.

90. Safety Evaluation Report for CNS Technical Specifications Amendment 136, February 25, 1991.

91. DC 89-272.

92. NRC Safety Evaluation Report (SER) for response to Generic Letter 84-09, the District's Standby Nitrogen Injection (SBNI) System.

93. DC 86-038.

94. DC 91-001, Amendment 1.

95. Deleted.

96. Deleted.

97. LCR 94-0110.

98. Q/A 5.13, Amendment 9.

99. Q/A 7.9, Amendment 14.

100. Q/A 14.6, Amendment 11.

101. License Amendment 112.

102. License Amendment 90.

103. GL 96-06.

104. GL 79-46.

105. GL 89-16.

106. GL 84-09.

107. NPPD Calculation NEDC 94-034, "Review of GE Nuclear Analyses GENE 673-020-0993 and GENE 637-045-01293 Supporting the Increase of the RHR Heat Exchangers Tube Plugging Margin, CNS Containment Analysis," Revision 2.

108. FSAR Amendment 14, Q&A 2.31.

109. Q/A 12.21, Amendment 9.

INSERT L

NLS2001064
Enclosure 1

COOPER NUCLEAR STATION

CALCULATION NEDC 97-044A

"NPSH Margins for the RHR
and CS Pumps"

Title: NPSH Margins for the RHR and CS pumps	Calculation No: NEDC 97-044A
	CED No: N/A
System/Structure: RHR & CS	Setpoint Change No: N/A
Component: RHR-P-A, B, C, & D; CS-P-A & B	Discipline: Mechanical
Classification: [X] Essential; [ ] Non-Essential	

Calc. Description:

Note: This calculation voids and supersedes NEDC 97-041, NEDC 97-042, and NEDC 97-044, Rev. 1.

The calculation estimates debris loadings available for strainer loading, as well as the NPSH margins for the RHR and CS pumps for a Design Basis LOCA with 95°F river water.

Conclusion

The adequate NPSHa margins exist at all normal and abnormal flowrates.

EE 01-023 will implement the results of this calculation into the appropriate design basis documents.

Attachments

- Attachment A - Results for Case 1, "Design Basis Definition (Design Basis LOCA)."
- Attachment B - Results for Case 2, "Bounding Case Definition (Worst Case for RHR - Design Basis LOCA)."
- Attachment C - Results for Case 3, "Bounding Case Definition (Worst Case for CS - Design Basis LOCA)."
- Attachment D - Minimum Containment Pressure Required for ECCS Pump Operation.
- Attachment E - Strain Active Area Estimate.
- Attachment F - Water and Pump Data Used in the Analysis.
- Attachment G - Suppression Pool Temperature and Pressure Data from GE .
- Attachment H - Examples of the Macros Used in this Evaluation.
- Attachment I - Equations Used in the Spreadsheets.
- Attachment J - K Factor Determination for the RHR and CS Suction Lines.
- Attachment K - Head-loss curves with a Clean Strainer for the RHR and CS Suction Lines.
- Attachment L - RMI Head-loss Evaluation.
- Attachment M - Estimate of the rise in suppression pool temperature solely due to pump work in the event both ECCS divisions respond to LOCA (Ref. GE SIL 603).

Rev. No.	Status	Revision Description	Prepared By/Date	Reviewed By/Date	Independent Design Verification/Date	Approved By/Date
0	3	Initial Issue	E. Kirchman 6/15/2001	6/15/2001	6/15/2001	6/19/01

Status Codes

1. Active
2. Information Only
3. Pending
4. Superseded or Deleted
5. OD/OE Support only

Nebraska Public Power District

DESIGN CALCULATION CROSS-REFERENCE INDEX

NEDC: NEDC 97-044A Preparer: E. Kirchman EK Reviewer: S. Nelson SN

Rev. No: 0 Date: 5/10/2001 Date: 6/15/2001

Item No.	DESIGN INPUTS	Rev. No.	PENDING CHANGES TO DESIGN INPUTS
1	NEDC 94-231	4	
2	NEDC 94-034	2	C/N 2C1,2C2
3	DI 2407	1	
4	NEDC 98-042	0	
5	NEDC 94-142	1	EJ 98-133
6	DC 89-252A	1	
7	EJ 97-125	0	
8	Drwg 105E2199	N01	
9	Drwg 105E2200	N01	
10	Drwg 105E2322, Sht. 1	N01	
11	Drwg 105E2322, Sht. 2	N01	
12	Drwg 105E2322, Sht. 3	N01	
13	Drwg 105E2452	N01	
14	A/D Drwg 882-3 (*)	N01	
15	A/D Drwg 886-3 (*)	N01	
16	A/D Drwg 857-3 (*)	C	
17	A/D Drwg 933-3 (*)	B	
18	CB&I Drwg 69	N05	
19	Iso 2603-1	N10	
20	Iso 2603-2	N09	
21	Iso 2625-1	N09	
22	Iso 2625-2	N09	
23	Iso 2625-4	N07	
24	Iso 2626-1	N06	
25	Iso 2626-2	N04	
26	Drwg 27953	N/A	
27	Drwg 28147	N/A	
28	Drwg 28148	N/A	
29	Drwg 28149	N/A	

(*) Denotes Status 3 drwgs

Nebraska Public Power District

DESIGN CALCULATION CROSS-REFERENCE INDEX

NEDC: 97-044A Preparer: E. Kirchman Reviewer: S. Nelson

Rev. No: 0 Date: 5/10/2001 Date: 6/15/2001

Item No.	DESIGN INPUTS	Rev. No.	PENDING CHANGES TO DESIGN INPUTS
30	Drwg TC-3374	N/A	
31	Drwg TC-3351	N/A	
32	ITS 3.6.2.1	178	
33	ITS 5.5.12.C	180	
34	MP 96-132	0	
35	NEDC 93-178	0	EJ 97-095, Rev. 1
36	NEDC 00-049	2	
37	NEDC 99-046	1	

Nebraska Public Power District

DESIGN CALCULATION CROSS-REFERENCE INDEX

NEDC: NEDC 97-044A Preparer: E. Kirchman EK Reviewer: S. Nelson

Rev. No: 0 Date: 5/10/2001 Date: 6/15/2001

Item No.	Affected Documents	Rev. No.	CHANGE Required
1	USAR Chapter V.6	LOEP xviii.8	Yes
2	Procedure 13.3	1	Yes
3	DCD-12	2	Yes
4	DCD-13	3	Yes
5	CNS Procedure 2.2.9	50	Yes
6	NEDC 00-049	2	No

Nebraska Public Power District

DESIGN CALCULATIONS SHEET

NEDC: NEDC 97-044A Preparer: E. Kirchman Reviewer: S. Nelson

Rev. No: 0 Date: 5/10/2001 Date: 6/15/2001

The purpose of this form is to assist the Preparer in screening new and revised design calculations to determine potential impacts to procedures and plant operations.©

	SCREENING QUESTIONS	YES	NO	UNCERTAIN
1	Does it involve the addition, deletion, or manipulation of a component or components which could impact a system lineup and/or checklist for valves, power supplies (breakers), process control switches, HVAC dampers, or instruments?	[ ]	[X]	[ ]
2	Could it impact system operating parameters (e.g., temperatures, flow rates, pressures, voltage, or fluid chemistry)?	[X]	[ ]	[ ]
3	Does it impact equipment operation or response such as valve closure time?	[ ]	[X]	[ ]
4	Does it involve assumptions or necessitate changes to the sequencing of operational steps?	[ ]	[X]	[ ]
5	Does it transfer an electrical load to a different circuit, or impact when electrical loads are added to or removed from the system during an event?	[ ]	[X]	[ ]
6	Does it influence fuse, breaker, or relay coordination?	[ ]	[X]	[ ]
7	Does it have the potential to affect the analyzed conditions of the environment for any part of the Reactor Building, Containment, or Control Room?	[X]	[ ]	[ ]
8	Does it affect TS/TS Bases, USAR, or other Licensing Basis documents?	[X]	[ ]	[ ]
9	Does it affect DCDs?	[X]	[ ]	[ ]
10	Does it have the potential to affect procedures in any way not already mentioned (see review checklists in Procedure EDP-06)? If so, identify:	[ ]	[X]	[ ]

If all answers are NO, then additional review or assistance is not required. If any answers are YES or UNCERTAIN, then the Preparer shall obtain assistance from the System Engineer and other departments, as appropriate, to determine impacts to procedures and plant operations. Affected documents shall be listed on Attachment 2.

Nebraska Public Power District

DESIGN CALCULATIONS SHEET

NEDC: NEDC 97-044A	Preparer: E. Kirchman EK	Reviewer: S. Nelson SN
Rev. No: 0	Date: 5/10/2001	Date: 6/15/2001

Revision Summary

Rev. 0 - This calculation voids and supersedes NEDC 97-042 and NEDC 97-044. It does, however, capture all the salient portions of both calculations to provide a clear design basis for the new ECCS strainers. This calculation also incorporates the new containment response data from NEDC 94-034, which, in turn, captured the consequences of going to a 95°F SW temperature, using GE-14 fuel, and applying a more conservative decay heat profile.

Nebraska Public Power District

DESIGN CALCULATIONS SHEET

NEDC: NEDC 97-044A	Preparer: E. Kirchman EK	Reviewer: S. Nelson
Rev. No: 0	Date: 5/10/2001	Date: 6/15/2001

Purpose

The purpose of this calculation is to estimate debris load available for strainer deposition, as well as to estimate the NPSH margins for the RHR and CS pumps while under a design basis LOCA scenario.

References

1) Crane Technical Paper #410, Dated 1985.
2) GE Licensing Topical Report NEDC-32721P, Rev. 1, "Application Methodology for GE Stacked Disk ECCS Suction Strainer," Dated November, 1997.
3) NEDO-32686-A, "Utility Resolution Guide (URG) for ECCS Suction Strainer Blockage," October 1998.
4) SER Related to NRC Bulletin 96-03, Boiling Water Reactor Owners Group Topical Report NEDO-32686, "Utility Resolution Guidance for ECCS Suction Strainer Blockage", Docket No. PROJ0691, Dated August 20, 1998.
5) Cameron Hydraulic Data, 17th Edition, First Printing, 1988.
6) DeLaval Engineering Handbook, Third Edition, Edited by Hans Gartmann, 1970.
7) NEDC-32687P, Rev.1, SAFER/GESTR-LOCA, Loss-of-Coolant Accident Analysis, Dated March 1997.
8) NEDC-32675P, Rev.1, SAFER/GESTR-LOCA, Analysis Basis Documentation, Dated June 1997.
9) NUREG/CR-6224, "Parametric Study of the Potential for BWR ECCS Strainer Blockage Due to LOCA generated Debris," Dated October 1995.
10) Regulatory Guide 1.82, Revision 2.
11) NRC Bulletin 96-03.
12) DED Letter 98127, Alan Able to Scott Freborg, "RHR Flow Loop Error Determination," Dated May 20, 1998.

Assumptions

1) The maximum and minimum LPCI flowrates will be assumed to be 9,240 and 6,500 gpm, respectively. The maximum value is based upon a broken loop injection rate of 8,800 gpm, extrapolated from NEDC 94-231, figures 1 though 4, plus a 5% margin to account for possible uncertainties as this calculation utilized measured pressure and flow data to determine the system's head curve. Whereas, the minimum value was taken directly from reference 8, pg 5-17, note 3, with no margin applied as this is an analytical limit. It should be also noted that the run-out flowrate (i.e., the injection flowrate with the minimum flow valve failed open) given in NEDC 94-231 is not applicable as the system's configuration as the result of the LPCI loop select modification ensures that power will be available to secure this line in the loop capable of injection and/or suppression pool cooling or containment spray. That is, for a LOCA/LOOP scenario coupled with a concurrent divisional power failure, one RHR pump will be located in a loop whose components and support systems are of the same Division, enabling it to perform its LPCI function (or to waste it in the event of a RR discharge line break), as well as to allow for the subsequent realigned into either suppression pool cooling or containment spray. Conversely, the other RHR pump will be located in a loop whose components and support systems are members of the failed Division, essentially freezing this loop into whatever alignment was in effect at the time of power failure, as well as removing any SW cooling water flow from that loop's RHR heat exchanger. The design and initial valve line-up does, however, ensure that injection into the vessel will occur for this loop, though any subsequent re-alignments into either suppression pool cooling or containment spray are impossible until divisional power is restored. Therefore, as a bounding analysis for NPSH

purposes, it will be conservatively assumed that this loop never comes on, capturing any ramification of an early loop shutdown in real life.

2) The minimum and maximum RHR flows whenever in containment spray mode will be assumed to be 6,500 and 8,300 gpm, respectively. The lower value is based upon an analytical limit for when RHR is in its spray mode, whereas the upper limit is based upon an estimated maximum flowrate analytically derived in NEDC 00-049. No instrument uncertainty was applied as these are assumed to be analytical limits, with sufficient conservatism to envelope any calculational uncertainties.
3) A run-out flowrate of 6,525 gpm will be conservatively assumed for CS. This assumption is based upon the upper bound value derived from NEDC 94-142, which already contains sufficient margins to account for measurement inaccuracies and uncertainties, and therefore, will be used as is.
4) For conditions other than run-out, the maximum CS flowrate will be assumed to be 5450 gpm. This value is based upon a maximum indicated flowrate of 4,750 gpm (Ref. CNS Procedure 2.2.9), plus 700 gpm to account for instrument error and uncertainty. Conversely, the minimum CS flow will be assumed to be 4,250 gpm (Ref. 8, pg 5-16), with no deduction for instrument error as it is an analytical limit. The 700 gpm margin conservatively bounds the error values given by DI 2407 for both CS divisions' flow meters.
5) The methodology used to determine the clean and dirty strainer head loss as defined in References 2 & 3 above is valid and provides conservative results. This assumption is based upon the actual prototype testing performed by the Boiling Water Reactor Owners Group (BWROG), from which the methodology was derived and validated. Therefore, this methodology will be accepted as is.
6) Run-out conditions for both the RHR and CS pumps will be conservatively assumed to begin at 10 seconds into the event. This is a conservative assumption, as depressurization cannot physically occur instantaneously.
7) The initial suppression pool temperature will be conservatively assumed to be 100°F. This assumption is based upon ITS Section 3.6.2.1, which specifies a maximum average suppression pool temperature of ≤95°F during normal power operation. This is a bounding assumption, as a higher initial pool temperature naturally results in a lower NPSH margin, simply because the vapor pressure of water increases as a function of temperature. Temporary suppression pool temperature excursion as allowed by ITS for testing purposes will not be considered as they are procedurally controlled to be of a short duration and of an infrequent occurrence. This assumption is consistent with the CNS design basis analysis.
8) For the purposes of a design basis analysis, the flowrates of the RHR and CS pumps will be assumed to be trimmed back to design values no sooner than 600 seconds into the event (i.e., 10 minutes). While this assumption may not result in the most conservative results, given the constraints imposed by Assumption 1, the net effect would be minimal.
9) The wet-well temperatures and pressures with containment spray, Case E, as provided by NEDC 94-034 (GE-NE-T23-00786-00-01) are conservative, and bound those, from an NPSH point of view, for all other Cases. This is because, given all other factors being equal, Case E's mode of operation naturally yields the lowest containment overpressure, which, in turn, has a dominant effect upon NPSH margins. For the purposes of this evaluation, the temperature and pressure profile data was obtained from a second Case E run that used initial conditions antagonistic to containment overpressure, and was done as an added measure of conservatism.
10) Containment pre-accident pressure, which is normally positive, and possibly as high as 0.5 psig, will be conservatively ignored.
11) The break location resulting in greatest amount of fibrous material destruction is a feedwater nozzle break, whose zone of influence, as defined by Reference 4, will be conservatively assumed to encompass the four feedwater nozzles, both JPI nozzles, and a portion of the head vent piping. This range of destruction is highly improbable, even given the jet redirecting influence of the vessel's

bioshield wall. Nevertheless, as an additional measure of conservatism, the total amount of fiber located within this zone of influence will be conservatively increased by 50%.

12) A fibrous material destruction factor of 28% within a zone of influence, coupled with a 100% transport factor, will be assumed. This methodology is essentially the same as recommended by Reference 3, and has be subsequently approved by the NRC (Reference 4) for Mark I containments. Cooper is a Mark I containment design.
13) The amount of loose debris, such as corrosion products, dirt, paint chips, etc., will be based upon plant or industry experience, with a preference given to the former. While these estimates do carry a significant factor of uncertainty, they represent the collective experience of the Boiling Water Reactor Owner's group and the opinion of industry experts, and are also in good agreement with the results provided by NUREG/CR-6224, "Parametric Study of the Potential for BWR ECCS Strainer Blockage Due to LOCA generated Debris," (Ref. 9). This study was performed on a Mark 1 Containment, making it directly applicable to Cooper. In cases where no such information is available, a value will be logically derived and justified via engineering judgement.
14) Containment over-pressure will be credited. This assumption is based upon Cooper's original design basis (Ref. SER Section 6.3, SER Dated February 14, 1973).
15) No fibrous loading on the strainers will be assumed prior to the event. This assumption is based upon past plant experience, which has consistently demonstrated that strainer loading during normal operation to be nil. Loose fibrous material within the suppression pool, as well as the plugging of some strainer holes, as allowed by CNS Procedure 13.3, will be included however.
16) Piping/vessel insulation is the sole source of the fibrous material available for transport into the suppression pool, and its base wool is approximately equivalent to Nukon insulation. This assumption is based upon the recommendations of Reference 4.
17) No settling of debris or fibrous material in the suppression pool will be assumed, with the exception of RMI and other heavy/bulky items whose specific gravity is much greater than 1. This is a bounding assumption, as some debris settling inevitably occurs. RMI and other high density debris, such as equipment tags, ID plates, wire ties, safety wire, banding, and other such similar materials, are excluded based upon their high specific gravity, ensuring a strong tendency to settle in the expected, post accident suppression pool environment.
18) Strainer head loss due to RMI and those caused by fibrous material (after adjustments for corrosion products, calcium silicate, rust flakes, dirt/dust, etc.) will not be summed as recommended by the NRC's SER. This assumption is based upon the test results obtained for a 60 point star strainer, which clearly indicate that head loss with fibrous material in conjunction with corrosion products meet or exceed those caused by a fibrous material, corrosion products, and RMI (Ref. 3, Volume 2, Table C-1, page C-14, runs J23 & J24) mixture. This methodology has also been suggested by the stainer's vendor based upon his engineering evaluation and test results (Ref. NEDC-32721P), and also applies to bulky and relatively heavy items, such as equipment tags, ID plates, wire ties, safety wire, banding, and other such similar materials .
19) A minimum amount of ECCS pumps consistent with the containment analysis (NEDC 94-034), with the modifications made by Assumption 1, will be assumed Post-LOCA. This assumption will increase a strainer's debris load by maximizing the amount of suppression pool water that must passed through it.
20) The higher bump-up factor given in the Utility Resolution Guidance (URG) for Calcium Silicate will be conservatively used (i.e., 6.12 versus 0.72), and will result in a higher projected head loss.
21) A service factor of 1.2 will be applied to the calculated piping losses to account for normal piping degradation. This factor is consistent with various publications, such as References 5 & 6 and others.
22) A design basis LOCA with containment spray results in the lowest NPSH margins, and bounds all other accident scenarios. This assumption is based upon a comparison of the wetwell pressure and suppression pool temperature profiles for this and all other accident Cases. From this comparision, it

was concluded that only Case E results in the lowest difference between containment overpressure and suppression pool temperature, coupled with the greatest potential for debris generation.

Methodology

A pump's Net Positive Suction Head (NPSH) must be greater than the vapor pressure of the liquid at any point within the pump or it will vaporize. Should this be occur, the resultant vapor pockets or bubbles will be carried along to a point of higher pressure where they will suddenly collapse, and, depending upon the conditions, could collapse with sufficient force to result in metal removal, provided they come in contact with the pump's walls and impeller at the time of implosion. This condition will also result in reduced flow, a loss of efficiency, and increased noise and vibration levels. Commonly referred to as pump cavitation, it has the potential to significantly reduce pump performance, life, and reliability. Damage will generally be found in the pump's suction bell and the inlet edge of the impeller's vanes.

For adequate NPSH to exist, the available NPSH, or NPSHa, must meet or exceed the pump's minimum NPSH requirements, or NPSHr. NPSHr is dependent upon the pump's design, and can only be reliably determined from suction pressure suppression tests, typically performed by the manufacturer prior to shipment. NPSHa is dependent upon plant design, and is defined a being equal to the equivalent total head taken at the pump's centerline corrected for vapor pressure, or;

NPSHa = h(abs) + h(static) - h(vapor pressure) - h(suction piping)

where;

h(abs)	=	Is the head corresponding to the absolute pressure on the surface of the liquid from which the pump draws.
h(static)	=	Is the head corresponding to the difference between the pump's centerline and the surface of the liquid.
h(vapor pressure)	=	Is the head corresponding to the vapor pressure at the liquid's temperature.
h(suction piping)	=	Is the head loss due to friction and turbulence for the conduit between the liquid's surface and the pump's inlet.

The NPSH requirements of the Core Spray and RHR pumps are shown on their respective certified pump curves as a function of flowrate (Ref Design Inputs 26 - 31).

For the purposes of this calculation, a spreadsheet program utilizing a macro written in Visual Basic will developed to calculate the NPSH margin (NPSHa - NPSHr), with NPSHa & NPSHr continually recalculated in discrete time increments based upon the flow conditions, the projected debris loading, and the wetwell conditions postulated at each time slice. Attachment H contains an example of the macros used in these calculations.

Since commercial business software (Excel) is essentially being used in a Level 2 application, as defined by CNS procedure 11.2, each specific calculation will be validated by hand calculations except for those that are repeated from cell to cell. In those cases, the results of the first and last cell will be validated to ensure proper carry through. Finally, all results will be graphed to see if the output resembles what would

be expected for the phenomena being modeled, and the cause for any deviations will be justified before accepting the output.

Beginning with the factor h(abs) defined above, its value will be determined directly from NEDC 94-034. This factor represents containment overpressure, and will be used in accordance with Cooper's licensing design basis (Ref. Assumption 14). This information will be linearly interpolated directly from the available data points.

The suppression pool's Technical Specification low water level of 874' 10" will be used to determine h(static), without any adjustments for increases in level due to steam condensation and thermal expansion. This is a conservative simplification, as both steam condensation and thermal expansion will cause the pool's level to increase, albeit modestly. Therefore, this analytical simplification will tend to bias the result slightly conservative direction.

The suppression pool's temperature as given in NEDC 94-034 will be used to determine the value of h(vapor pressure). Based upon this temperature data, the macro will linearly interpolate the vapor pressure using a look-up table containing saturated water data extracted from the ASME Steam Tables (Ref. 1).

In determining h(suction piping), two separate factors had to be considered; suction piping loss, which varies as function of flowrate and fluid temperature, and strainer head loss, which varies as a function of debris loading, fluid temperature, and flowrate. The isometrics for the CS and RHR suction piping were used to tabulate the losses for each individual component, which was then corrected to the initial pipe diameter and summed to obtain the characteristic K factor equation for each line (See Attachment J). This characteristic equation is then used by the spreadsheet's macro to determine the dynamic head loss after the line's Reynold's number and friction factor (using Colebrook's equation) are first determined. A service factor of 1.2 will then applied to the calculated piping loses in accordance with Assumption 21.

The strainer's head loss is more problematic, for its head loss is in part a function of the debris load coming to rest upon its surface, which, in turn, is directly related upon the total amount of water that has passed through it, and in part due to frictional losses. Mass loading will be obtained by multiplying the debris mass fraction initially in the pool by the strainer's loading factor. This loading, as well as the ratio of the constituents in the debris mass, will be then used in the methodology suggested by NEDC-32721P (Ref. 2) and URG's Technical Support Documentation (Ref. 3) to define the strainer's debris induced head loss as a function of time.

By taking advantage of the fact that a strainer's debris loading is solely dependent upon the total amount of water that has passed through it, a bounding case can be developed for either CS or LPCI. Accordingly, for Cooper, a LOCA/LOOP scenario, with the single limiting failure of a single diesel generator, satisfies this criterion, and does so because a minimum number of ECCS pumps will be in operation; two LPCI pumps and CS pump, coupled with the fact that the failure of a single diesel generator will also prevent one LPCI loop from subsequently entering into suppression pool cooling or containment spray. (See Assumption 1). This evaluation will go one step further and assume that this one loop never operates as to provide a bounding, worst case analysis that captures the ramifications of an early pump termination via operator action.

To account for potential strainer plugging from fugitive items, such as rubber gloves, equipment tag, or any other such non-porous material, a blockage area equal to 5% of the CS strainers active area, or about 1674 in^2, will be applied against each flowing strainer (See the description for Cells H31 & H32, and also Cells

D99, F99, & H99, for specific details on how this was implemented). This will enable future operability evaluations to be performed in the event some such fugitive items are discovered or subsequently identified.

Case Definitions

Bearing the aforementioned in mind, various cases will be developed to define the design basis scenario and other scenarios that will effectively maximize either RHR or CS strainer debris loadings. Therefore, starting with the design basis scenario;

Case 1 - Design Basis Definition (Design Basis LOCA)

In this case, the ECCS flowrates for the two loops that will continue to operate after realignment to containment spray mode (i.e., 600 seconds) have been maximized, while the LPCI loop suffering the consequences of the Divisional power failure will be conservatively assumed to remain off (See Assumption 1). Once in long term cooling, the flowrates will be reduced to their design basis valves, and assumed to remain constant for the duration of the event.

Division I

$0 \leq t \leq 600$ seconds	*CS Loop A =*	*6,525 gpm*	*(Assumption 3)*
	RHR Loop A =	*9,240 gpm*	*(Assumption 1)*
	RHR Loop B =	*0 gpm*	*(Assumption 1)*
$t > 600$ seconds	*CS Loop A =*	*4,750 gpm*	*(Design flowrate)*
	RHR Loop A =	*7,700 gpm*	*(Design flowrate)*
	RHR Loop B =	*0 gpm*	*(Assumption 1)*

Division II

$0 \leq t \leq 600$ seconds	*CS Loop B =*	*6,525 gpm*	*(Assumption 3)*
	RHR Loop C =	*0 gpm*	*(Assumption 1)*
	RHR Loop D =	*9,240 gpm*	*(Assumption 1)*
$t > 600$ seconds	*CS Loop B =*	*4,750 gpm*	*(Design flowrate)*
	RHR Loop C =	*0 gpm*	*(Design flowrate)*
	RHR Loop D =	*7,700 gpm*	*(Assumption 1)*

Case 2 - Bounding Case Definition (Worst Case for RHR - Design Basis LOCA)

Next, to maximize the debris loading on a RHR strainer, the previous case will be modified by reducing the CS flowrate and by increasing the flowrate in the one LPCI loop that will subsequently perform containment spray to its analytical limits. As in the previous case, once

in long term cooling, the flowrates will be assumed to remain constant for the duration of the event.

Division I

0 ≤ t ≤ 600 seconds	*CS Loop A =*	*4,250 gpm*	*(Assumption 4)*
	RHR Loop A =	*9,240 gpm*	*(Assumption 1)*
	RHR Loop B =	*0 gpm*	*(Assumption 1)*
t > 600 seconds	*CS Loop A =*	*4,250 gpm*	*(Assumption 4)*
	RHR Loop A =	*8,300 gpm*	*(Assumptions 2 & 22)*
	RHR Loop B =	*0 gpm*	*(Assumption 1)*

Division II

0 ≤ t ≤ 600 seconds	*CS Loop B =*	*4,250 gpm*	*(Assumption 4)*
	RHR Loop C =	*0 gpm*	*(Assumption 1)*
	RHR Loop D =	*9,240 gpm*	*(Assumption 1)*
t > 600 seconds	*CS Loop B =*	*4,250 gpm*	*(Assumption 4)*
	RHR Loop C =	*0 gpm*	*(Assumptions 2 & 22)*
	RHR Loop D =	*8,300 gpm*	*(Assumption 1)*

Case 3 - Bounding Case Definition (Worst Case for CS - Design Basis LOCA)

Similarly, to maximize the CS strainer debris loading, the Case 1 will be modified by increasing the CS flowrate to its analytical limits and by decreasing the LPCI loop subsequently performing containment spray to its analytical limit.

Division I

0 ≤ t ≤ 600 seconds	*CS Loop A =*	*6,525 gpm*	*(Assumption 3)*
	RHR Loop A =	*6,500 gpm*	*(Assumption 1)*
	RHR Loop B =	*0 gpm*	*(Assumption 1)*
t > 600 seconds	*CS Loop A =*	*5,450 gpm*	*(Assumption 4)*
	RHR Loop A =	*6,500 gpm*	*(Assumption 2)*
	RHR Loop B =	*0 gpm*	*(Assumption 1)*

Division II

0 ≤ t ≤ 600 seconds	*CS Loop B =*	*6,525 gpm*	*(Assumption 3)*
	RHR Loop C =	*0 gpm*	*(Assumption 1)*
	RHR Loop D =	*6,500 gpm*	*(Assumption 1)*

t > 600 seconds	*CS Loop B =*	*5,450 gpm*	*(Assumption 4)*
	RHR Loop C =	*0 gpm*	*(Assumption 2)*
	RHR Loop D =	*6,500 gpm*	*(Assumption 1)*

The results of these cases will be reported both in tabular and graphical form.

Debris Load Definition

Fibrous Material

There is approximately 93 cubic feet of fibrous insulation installed in the Drywell, with the majority being installed on the RPV feedwater nozzles (about 56 cubic feet), and on the two jet-pump instrumentation nozzles (about 10.5 cubic feet)(Ref. NEDC 93-178).

As CNS does not have a defined set of break locations, it is necessary to postulate that a break at one of these nozzles may occur. Furthermore, as all these nozzles are all located within the bioshield wall, and without the benefit of a complex analyses in hand, it is additionally necessary to conservatively postulate that the zone of influence, as defined by Reference 3, would encompass all of this insulation, plus another 8 cubic feet installed on the reactor vent piping due to its close proximity. Using the URG's recommendations for a Mark I containment, which have been approved by the NRC (Reference 4), approximately 28% of the material in the zone of influence will be converted to fines, all of which will subsequently be transported to the suppression pool. Therefore, the fibrous material available for strainer loading is conservatively estimated to be;

$$56 + 10.5 + 8 = 74.5\ ft^3$$

Arbitrarily increasing this amount by 50%, yields;

$$74.5 * 1.5 \approx 112\ ft^3$$

Per Reference 4, about 28% of this will result in fines capable of transportation into the suppression pool;

$$112 * 0.28 \approx 31.4\ cubic\ feet$$

Using a density of about 2.4 Lbm/ft^3 (Assumption 13), this is equal to;

$$31.4 * 2.4 \approx 75.3\ Lbm$$

Finally, an additional accounting of loose fibers within the suppression pool must be made. Per CNS procedure 13.3, up to 12 million fibers is acceptable. To convert this criterion to an equivalent mass, the average fiber length will be conservatively assumed to be one-half inch. This is conservative as the mean fiber length will be approximately 6 mm, or about 0.24 inches per NLS 950218, page 2, last paragraph. Thus, the equivalent mass is found via;

*Mass Equivalent = (Volume of One Fiber) * (Number of Fibers) * (Fiber Density)*

The final calculation will be incorporated into the spreadsheet.

Sludge

Reference 3 gives conservative estimate of 150 Lbs/yr (dry weight) based upon a survey of several BWRs. Nevertheless, for the purposes of this calculation, a generation rate of 200 Lbs/yr (dry weight), or 300 Lbs/cycle, will be conservatively assumed based upon past de-sludging experience. Assuming a de-sludging period of 4 operating cycles, the maximum available amount of sludge available for strainer deposition is therefore,

*300 * 4 = 1,200 Lbs*

Dirt/Dust

Reference 3 gives a conservative estimate of 150 Lbs. No calculational estimate is provided by this source, but logically appears reasonable, if not somewhat conservative. CNS has no related experience in this area, but accepts reference 3's recommendation based upon engineering judgement.

Paint Chips/Zinc Oxide

An evaluation of the paint coatings inside the Drywell was performed by Bechtel. As the result of this evaluation, a conservative value of 500 Lbs will be used.

Calcium Silicate

The use of calcium silicate in the Drywell is very limited, significantly limiting it as viable destructive candidate. Nevertheless, for conservatism, 20 Lbs will be arbitrarily assumed again on the basis of engineering judgement.

Sand

CNS has not detected large amounts of sand in the suppression pool. Furthermore, any sand blasting activities are carefully controlled to ensure all blasting material is completely removed upon completion. Therefore, via engineering judgement, this will not be considered a credible debris at CNS.

Zinc Filler

The only viable zinc source is from the Optimum Water system and from the wetwell's coating. In the former case, any zinc appearing in the suppression pool by this system will be on the atomic level, hardly making it like to aid in strainer clogging. On the other hand, Zinc filler from degrading coatings is a real possibility. Nevertheless, given the type of coating used at CNS, the leach rate for any zinc filler

has been found to be very small. Therefore, via engineering judgement, this will not be considered a credible debris at CNS.

RMI

RMI insulation is used extensively in the Drywell, and would certainly fall within the zone of influence in almost any break scenario. However, per Assumptions 17 & 18, a parametric accounting of the amount of RMI available for strainer loading is not required because of its strong tendency to settle, as well as to its minimal impact upon strainer performance due to the strainer's inherently low approach velocity. That is, by design, the velocity field vector around a strainer is very low, naturally minimizing RMI's attraction to it. What little that does get attracted to it will not be drawn tight against its surface, minimizing its ability to cause area or flow blockage. A separate evaluation will however, be performed to estimate a strainer's headloss solely by RMI to satisfy the NRC requirements.

Other Latent Materials

Possible sources are, rags, plant equipment tags, anti-sweat insulation, weld splatter, grinding dust, etc. For the most part, the volume of these sources is so small as to be beyond engineering concern. Nonetheless, even if not, it should be noted that the conservative estimates used earlier for dirt/dust easily account for any weld splatter and/or grinding dust, and that plant tags, fabricated from either metal strips or plastic, are relatively bulky and heavy items possessing a high specific gravity, causing them to settle quickly to the suppression pool's floor in the unlikely event they should even make it that far. Anti-sweat insulation is also not a concern, as it has a strong tendency to float almost indefinitely, no matter how small the fragment, effectively keeping it away from the deeply submerged strainers. Fugitive materials, that is, items accidentally left behind, or new, non-porous materials not previously considered, will however be accounted for by strainer plugging.

Debris Loading Summary

Fibrous Material (Nukon) (Note 1)	*74.5 Lbs*
Sludge	*1200 Lbs*
Dirt/Dust	*150 Lbs*
Paint Chips	*500 Lbs*
Rust	*50 Lbs*
Calcium Silicate	*20 Lbs*
Sand	*0 Lbs*
Zinc Filler	*0 Lbs*

Note 1; Includes an arbitrary 50% margin.

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Conclusions

The results of Cases 1, 2, & 3 are contained in the following attachments;

Case 1 . . . . . *Attachment A*
Case 2 . . . . . *Attachment B*
Case 3 . . . . . *Attachment C*

The NPSH margins (in psi) are shown graphically in the front part of each attachment, with the remaining pages containing the tabular data used to create these graphs. The tabular data was included to minimize the errors typically encountered when reading values off of graphs.

It should be noted that Case 1 represents a nominal design value calculation, with Cases 2 & 3 applying the deleterious effects of instrument uncertainty against the nominal design values to establish the true bounding limits of operability.

An atmospheric pressure of 14.2 psig with a constant primary containment leakage rate of 0.635%/day was conservatively used in this evaluation except for Case 1 (Attachment A), and its related curves used in the over-pressure study (Attachment D) (See "Containment Over-pressure Study," later in this section for additional information).

The remaining attachments are either back-up material, provide input to this evaluation, or are necessary to explain how portions of these evaluations were performed.

Attachment D - Provides the curves that define the minimum containment pressure required for ECCS pump operation for design basis flowrates and others.

Attachment E - Provides the methodology used to estimate the strainer's surface and flow areas. This information was needed to calculate the effects of blockage.

Attachment F - Provides the fluid properties used in the macros.

Attachment G - Provides the temperature and pressure profiles of the suppression pool and suppression chamber derived from NEDC 94-034.

Attachment H - Provides an example of the macro used in all the spreadsheets.

Attachment I - Provides the equations used in the spreadsheets for calculating the strainer's clean and debris induced head loss, as well as the source of these equations.

Attachment J - Provides the K Factor determinations used to develop the characteristic equation of each suction line. These equation were used by the spreadsheet to calculate line losses. .

Attachment K - Provides the head loss curves for the CS and RHR pumps' suction piping with 95 and 200°F suppression pool water, and include the head loss of a clean suction strainer

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Attachment L - RMI head loss evaluation carried forward from NEDC 97-044, and included to demonstrate that RMI losses by themselves are but a small fraction of the head loss expected from fibrous debris.

Attachment M - Spreadsheet used to estimate the rise in suppression pool temperature solely due to pump work in the event both ECCS divisions respond to a LOCA (Includes a copy of GE SIL 603).

Calculated NPSH Margins

From Attachments A, B, & C, the following minimum NPSH margins were tabulated;

Case	RHR Pump A	RHR Pump B	RHR Pump C	RHR Pump D	CS Pump A	CS Pump B
1	*0.62 psi*	*N/A*	*N/A*	*0.61 psi*	*1.94 psi*	*1.91 psi*
2	*0.24 psi*	*N/A*	*N/A*	*0.23 psi*	*5.79 psi*	*5.77 psi*
3	*3.69 psi*	*N/A*	*N/A*	*3.68 psi*	*0.14 psi*	*0.12 psi*

Containment Over-pressure Study (Attachment D)

To determine how much containment over-pressure is required to meet the pump's NPSH requirement, the over-pressure requirements of both the RHR and CS systems were calculated and plotted, with the result contained in Attachment D. In general, it can be deduced that a minimum over-pressure of at least 9 psig is required for RHR and 8 psig for CS (Ref. Attachment D, pages 2, 4, & 6).

The minimum over-pressure curves are based upon a mean atmospheric pressure of 14.7 psia and a containment leakage rate of 5%/Day for the curves associated with Case 1's flowrates, and 14.2 psia and 0.635%/Day for all others. The 14.2 psia value is simply the atmospheric pressure at sea level (i.e., 14.7 psia) adjusted for CNS's 900 ft site elevation, and for a Technical Specification containment leakage rate of 0.635%/Day. In either case, the positive, pre-accident containment pressure, which is normally maintained whenever the reactor is critical, was conservatively ignored.

The higher pressure and leakage rate used in this study matches those used in the original analysis supporting CNS's licensing for NPSH margins, and was done to allow for a direct comparison between the two.

It should also be noted that the minimum containment over-pressure determined by this evaluation is in excess of those originally assumed at the time of licensing. This, however, has no real significance, as an excessive amount of containment over-pressure is available throughout the event as witnessed by the curves contained in Attachment D, and ensures a comfortable NPSH margin remains in effect at all times for the nominal licensing flowrates. These curves also indicate that containment over-pressure is required whenever pool temperature exceeds approximately 170°F or RHR and 183°F for CS for these conditions.

Conservatism Applied

In general, it should be noted that all these evaluations are conservative because of the magnitude of the material assumed transported into the suppression pool, coupled with conservative assumptions on the amount of dirt, paint chips, and corrosion products available for strainer loading. Nevertheless, these assumptions are in conformance with URG's recommendations, and generally meet or exceed those suggested by the NRC. The conservative assumptions used in establishing the limiting case also ensure that the debris loadings from a complete spectrum of breaks have been captured, meeting the requirements of 10CFR50.46.

The strainer's head loss was calculated using the methodology recommended by General Electric in NEDC-32721P, which is slightly different than URG's methodology. While this methodology is non-mechanistic, it has been derived from test data for a prototype strainer of a similar design to Cooper's that was subjected to comparable fibrous and particulate loadings. Therefore, the strainer head loss predictions have in essence been validated by test. Conservatism has also been applied to General Electric's model to account for any potential modeling uncertainties, including the use of bump-up factors to account for the effects of miscellaneous debris. These factors were developed in accordance with URG's methodology and are, in general, considered to be conservative.

Suction line losses where accounted for by using a rational methodology as given by Crane Technical Paper #410, which has been proven by experience to generally provide conservative results; typically by 5 to 20%. Nevertheless, to account for normal piping degradation, the calculated headloss was increased by 20% (Assumption 21).

Containment leakage was conservatively assumed to a constant value. Whereas the actual leakage is a function of the pressure differential between containment and the environs within secondary containment.

Only one RHR & CS loop is assumed to operate. With the available debris loads now spread only between two strainers, a bounding evaluation results.

Finally, this evaluation a constant, maximum river temperature was assumed, which simply can never happen. Even under the most adverse conditions, it would fluctuate, resulting in a lower average value and greater average NPSH margins.

GE SIL 603

GE SIL 603 alerts BWR owners that the limiting conditions assumed for NPSH analysis can change, based on changes to analysis assumptions or system modifications. Specifically, this GE SIL suggests that the short-term NPSH (the first 10 minutes of system operation) may become more limiting due to changes in assumptions from those used during original design basis evaluations.

Every example specifically discussed in GE SIL 603 has been addressed in this calculation. These include;

- Different core decay heat and feedwater system energy content assumptions. The data used for suppression pool and wetwell response for this NPSH calculation considers a new decay heat curve, which contains 2-sigma uncertainty and addresses GE SIL 636 dealing with decay heat from activation

products and miscellaneous actinides. The energy content from feedwater is included in the containment analysis for NPSH, contained in NEDC 94-034 (GE-NE-T23-00786-00-01).

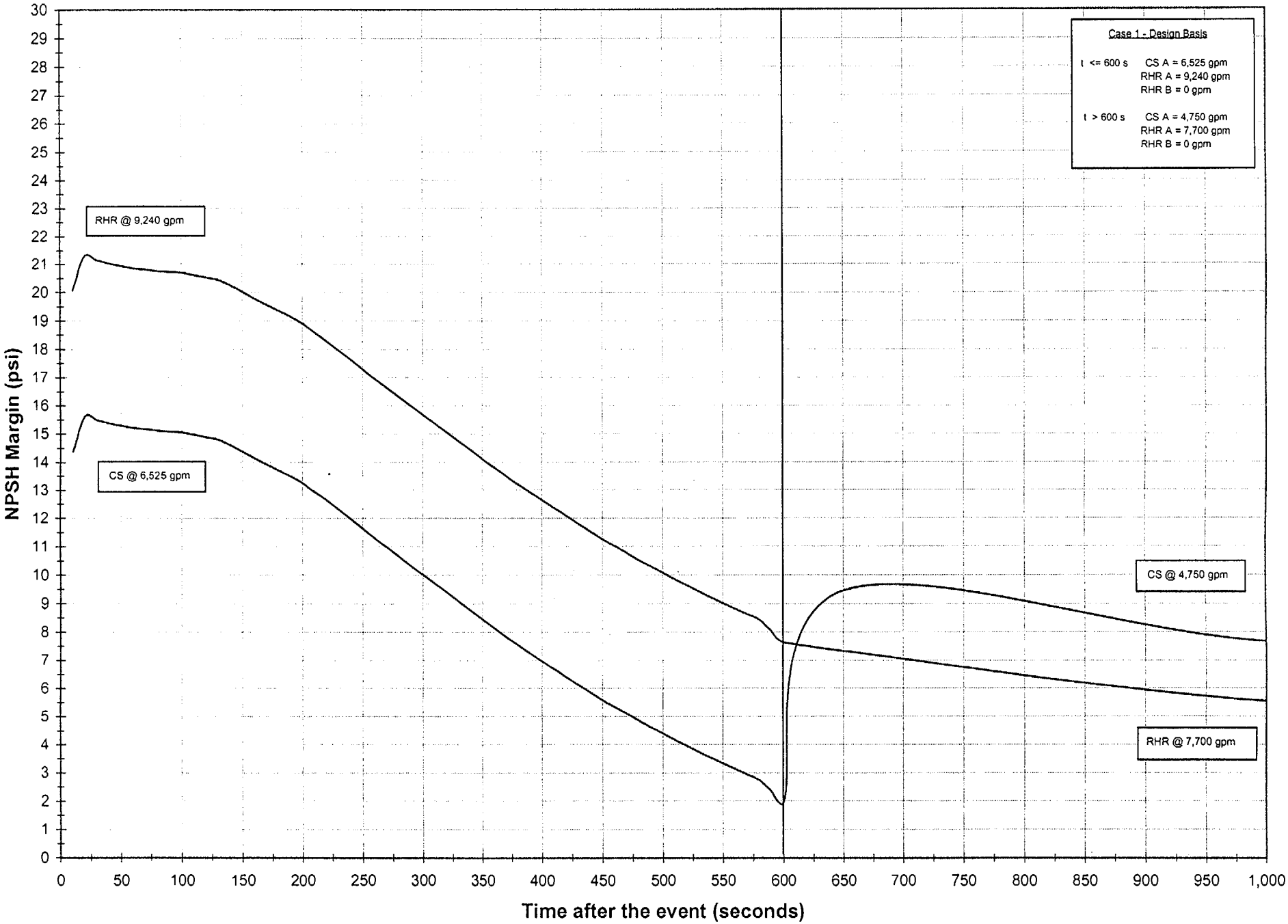
- Maximum ECCS flow conditions (no operator action to throttle flow is assumed for 10 minutes). This calculation assumes maximum flowrates for the first 10 minutes, with no credit taken to throttle flow until after 10 minutes.
- LPCI modification and suction strainer modifications. This calculation considers the current CNS configuration, which addresses both of these modifications.
- Licensing basis changes, such as adoption of higher suppression pool temperature or Ultimate Heat sink temperature limits. This calculation addresses the possibility of both and analyzes NPSH for a bounding scenario with respect to CNS current licensing basis.
- When changing low pressure ECCS design or licensing basis, consideration should be given to whether or not the proposed changes affect the limiting NPSH condition (i.e.- the limiting condition may change from long-term to short-term). This calculation addresses NPSH for the entire event duration and therefore considers both long and short term affects.

In addition to the items specifically addressed in GE SIL 603, consideration was given to the potential impact of no loss of off site power and all injection pumps being available for the first 10 minutes. This case would result in slightly higher suppression pool temperatures due to the additional pump heat added. This additional pump heat is shown to be insignificant, resulting in short term suppression pool temperature increase of 0.4 °F and 1.2 °F at 10 and 30 minutes respectively (Ref. Attachment M). Increased ECCS flowrates may result in more water mass flowrate out of the break, thus reducing the pressure in containment. The effect on pressure is expected to be minimal and is of no safety significance, since RHR does not require any overpressure within the first 10 minutes and the CS pump vendor has provided a letter stating that these pumps can operate under runout cavitation conditions for the period being considered without suffering long term damage (See Design input 5 for a copy of the letter). Additionally, for this scenario, the strainer debris loading would be much less than that assumed due to the debris being distributed over 4 additional strainers. Therefore, sufficient assurances exist to ensure that adequate ECCS pump operation will occur in this scenario and the assumption of minimum pump availability is conservative and bounding with respect to NPSH margins in both the long and short term.

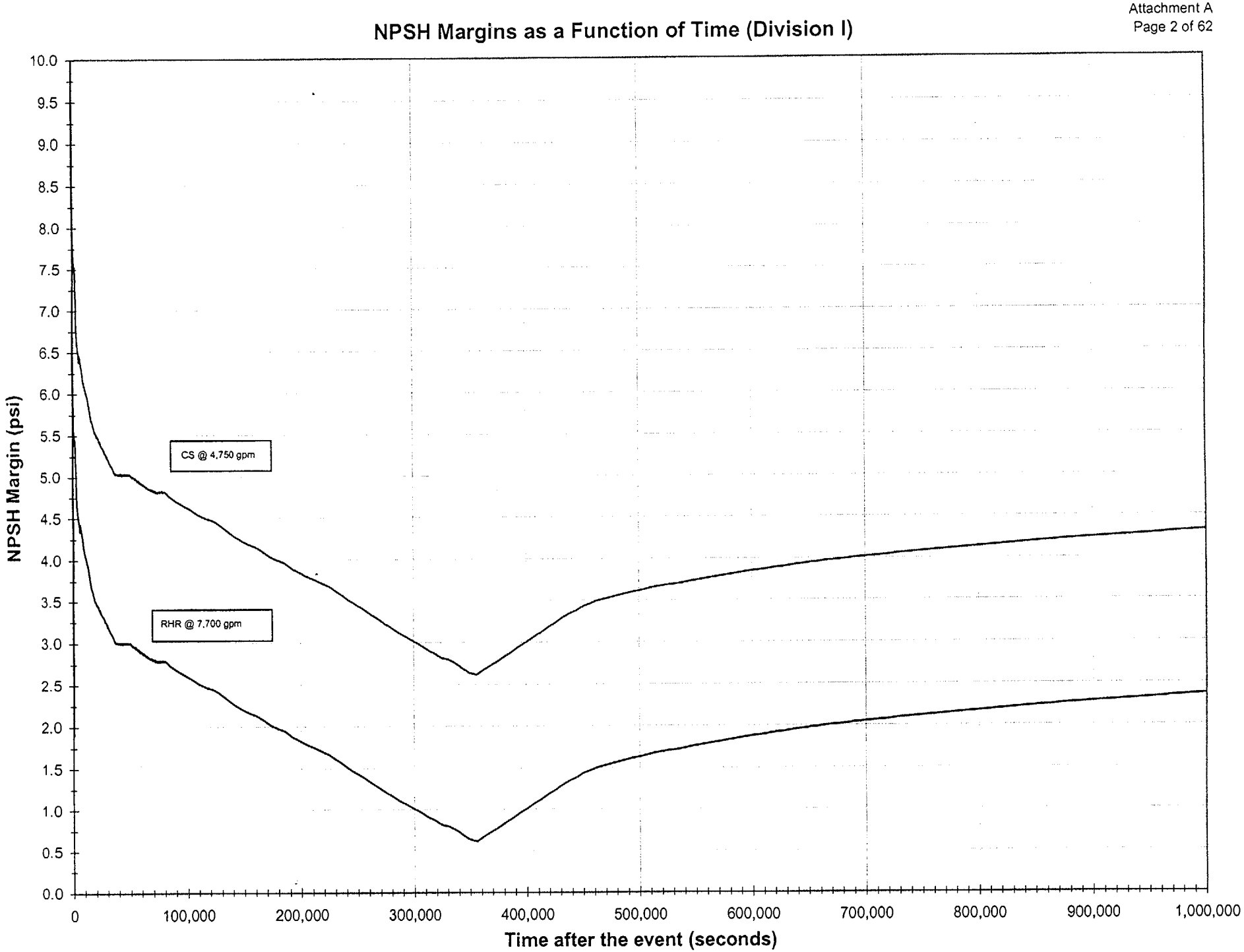
Impact Upon Cooper's SER

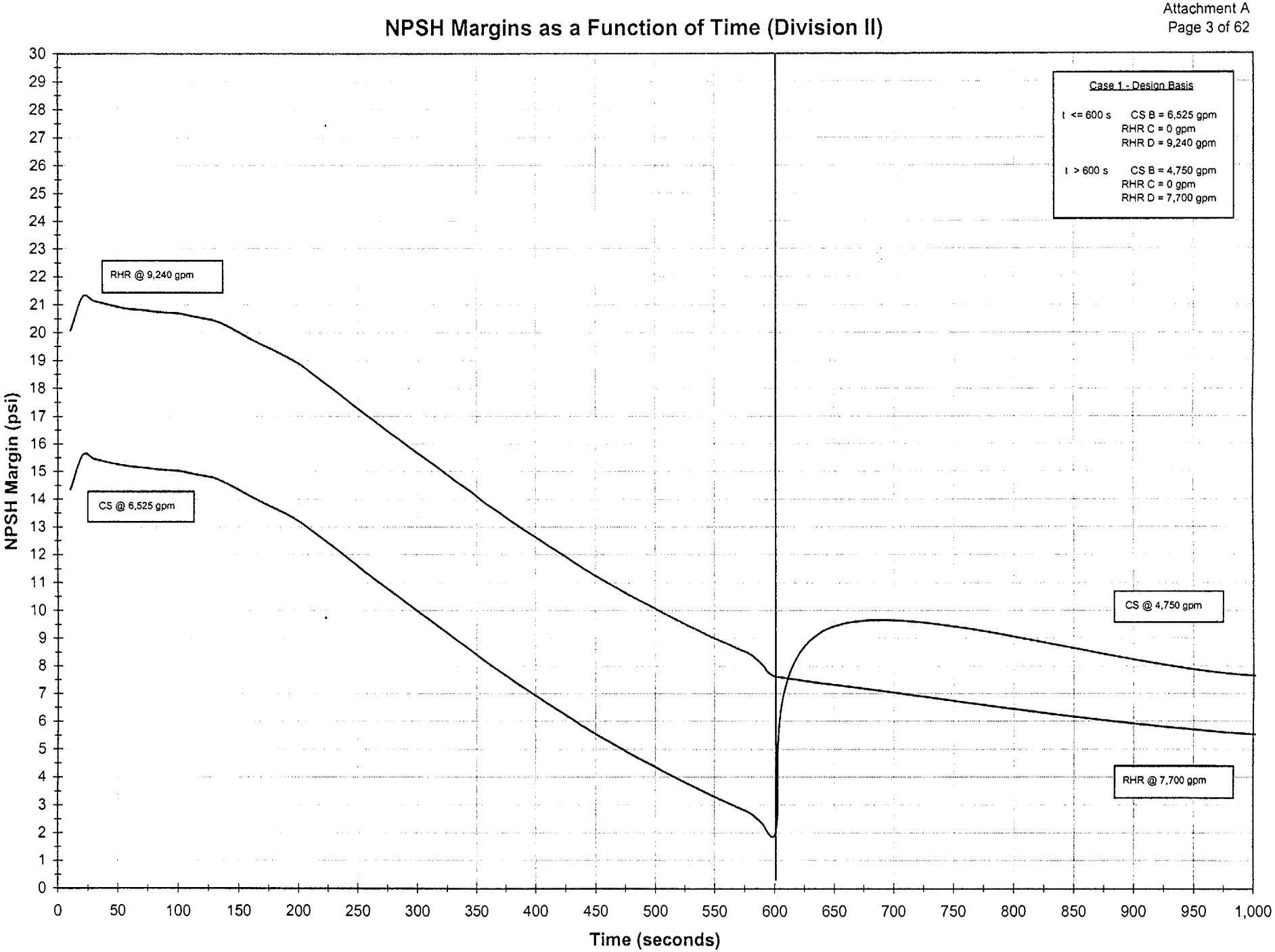
It should be noted that in Cooper's original SER, it was assumed that at least a 3 psi margin exists between the minimum containment pressure and the pressure required for minimum NPSH at the RHR pump, and a 6 psi margin for the CS pump. Per this evaluation, even with the implementation of larger strainers, the losses invoked by the projected debris loads, coupled with the new methodology used to predict debris load induced strainer head loss, the assumed margins can no longer be met. Nevertheless, this reduction in margin has no safety significance as a positive NPSH margin remains, even after considering the deleterious effects of instrument uncertainty.

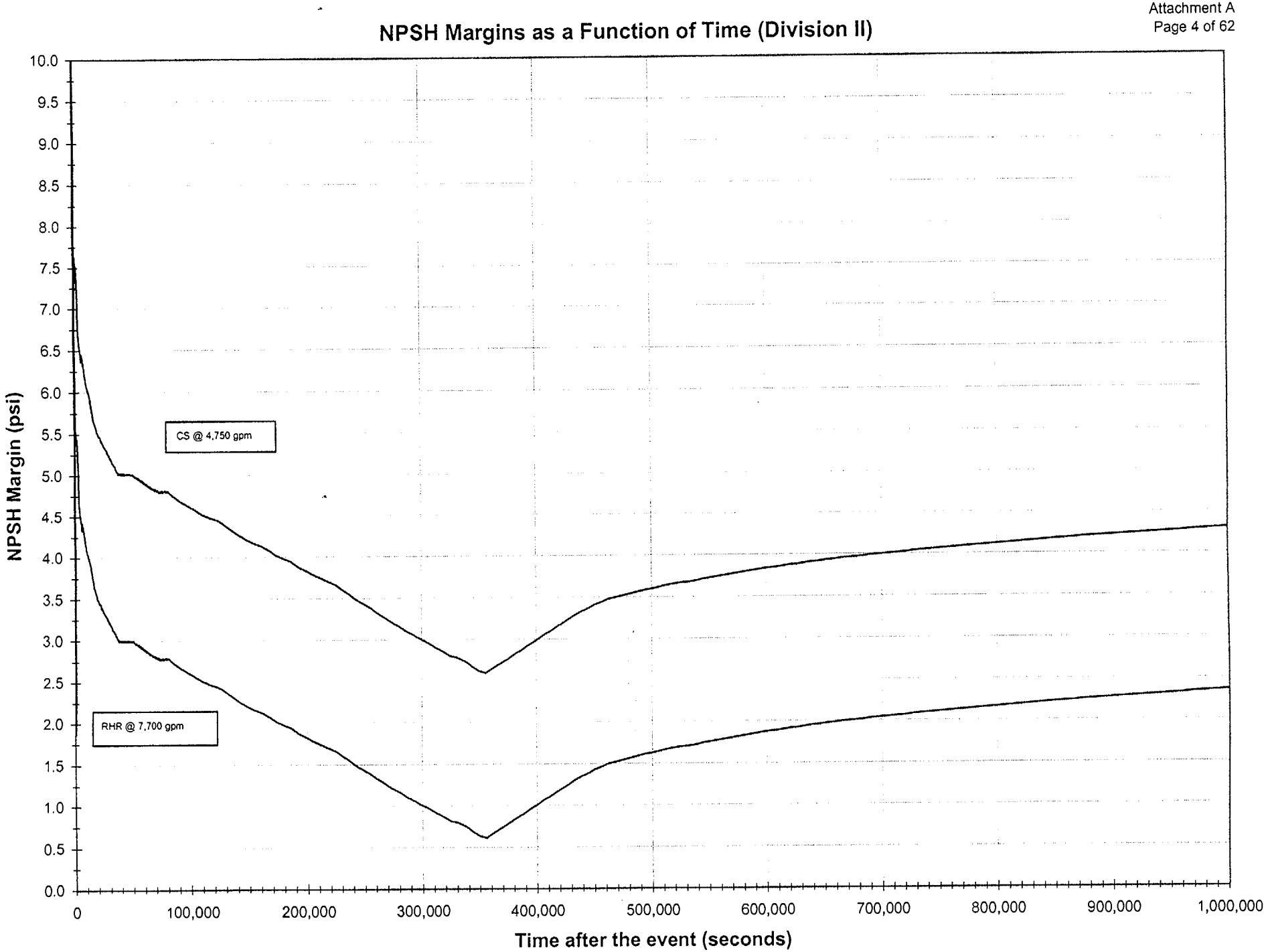
NPSH Margins as a Function of Time (Division I)



All pages in Attachment A checked
6/15/01


NPSH Margins as a Function of Time (Division I)
NPSH Margin (psi)
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
CS @ 4,750 gpm
RHR @ 7,700 gpm
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000
800,000
900,000
1,000,000
Time after the event (seconds)


NPSH Margins as a Function of Time (Division II)
Case 1 - Design Basis
t <= 600 s CS B = 6,525 gpm
RHR C = 0 gpm
RHR D = 9,240 gpm
t > 600 s CS B = 4,750 gpm
RHR C = 0 gpm
RHR D = 7,700 gpm
RHR @ 9,240 gpm
CS @ 6,525 gpm
CS @ 4,750 gpm
RHR @ 7,700 gpm
NPSH Margin (psi)
Time (seconds)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1,000


NPSH Margins as a Function of Time (Division II)
NPSH Margin (psi)
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
CS @ 4,750 gpm
RHR @ 7,700 gpm
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000
800,000
900,000
1,000,000
Time after the event (seconds)

Case ->	**1**							
			Run profiles Used					
		T<=	*T>*					
Division I		600	600	*Terminating at ->*		1,000,000	*Seconds*	
CS pump A ->		6,525	4,750	*Gpm*				
RHR pump A ->		9,240	7,700	*Gpm*				
RHR pump B ->		0	0	*Gpm*				
					Amount of Fibrous Material			
Division II						75.3	*Lbm*	
CS pump B ->		6,525	4,750	*Gpm*				
RHR pump C ->		0	0	*Gpm*				
RHR pump D ->		9,240	7,700	*Gpm*				
Interpolation routine using Suppression Pool temperature/pressure data in 97044G.xls								
time (sec) ->			999,900					
Pool Temp (°F) ->			147.5					
Chamber Pressure (psia) ->			14.7	*(Constant La =5%/day assumed)*				
				Base pressure used ->			14.7	*psia*
Calculated Margins as a Function of Time (psi)								
Division I					**Division II**			
	CS	**RHR**				**CS**	**RHR**	
Time (sec)	**Pump A**	**Pump A**	**Pump B**		**Time (sec)**	**Pump B**	**Pump C**	**Pump D**
10	14.37	20.07			***10***	14.34		20.06
20	15.62	21.29			***20***	15.58		21.28
30	15.49	21.15			***30***	15.45		21.13
40	15.38	21.03			***40***	15.34		21.02
50	15.29	20.93			***50***	15.25		20.92
60	15.21	20.85			***60***	15.17		20.84
70	15.17	20.82			***70***	15.14		20.81
80	15.12	20.76			***80***	15.08		20.75
90	15.08	20.73			***90***	15.04		20.71
100	15.05	20.70			***100***	15.02		20.69
110	14.97	20.62			***110***	14.93		20.60
120	14.88	20.53			***120***	14.85		20.52
130	14.79	20.44			***130***	14.76		20.43
140	14.61	20.26			***140***	14.57		20.25
150	14.37	20.02			***150***	14.34		20.01
160	14.14	19.79			***160***	14.10		19.78
170	13.92	19.57			***170***	13.88		19.56
180	13.71	19.36			***180***	13.67		19.35
190	13.50	19.15			***190***	13.46		19.14
200	13.25	18.91			***200***	13.22		18.90
210	12.94	18.60			***210***	12.91		18.59
220	12.63	18.29			***220***	12.60		18.28
230	12.31	17.97			***230***	12.28		17.96
240	11.97	17.63			***240***	11.94		17.62
250	11.64	17.29			***250***	11.60		17.28

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
260	11.30	16.96			***260***	11.26		16.95
270	10.98	16.64			***270***	10.94		16.63
280	10.65	16.32			***280***	10.62		16.31
290	10.33	16.00			***290***	10.30		15.99
300	10.02	15.68			***300***	9.98		15.67
310	9.70	15.37			***310***	9.67		15.36
320	9.39	15.05			***320***	9.35		15.04
330	9.07	14.74			***330***	9.04		14.73
340	8.76	14.43			***340***	8.72		14.42
350	8.44	14.11			***350***	8.41		14.10
360	8.14	13.81			***360***	8.11		13.80
370	7.84	13.51			***370***	7.80		13.50
380	7.54	13.21			***380***	7.50		13.20
390	7.25	12.92			***390***	7.21		12.91
400	6.97	12.64			***400***	6.93		12.63
410	6.69	12.36			***410***	6.65		12.35
420	6.41	12.08			***420***	6.37		12.07
430	6.13	11.80			***430***	6.09		11.79
440	5.85	11.53			***440***	5.81		11.52
450	5.58	11.26			***450***	5.55		11.25
460	5.34	11.02			***460***	5.30		11.01
470	5.09	10.77			***470***	5.06		10.76
480	4.85	10.53			***480***	4.81		10.52
490	4.62	10.30			***490***	4.59		10.29
500	4.39	10.07			***500***	4.36		10.06
510	4.16	9.85			***510***	4.13		9.84
520	3.95	9.64			***520***	3.92		9.63
530	3.74	9.43			***530***	3.71		9.42
540	3.53	9.22			***540***	3.49		9.21
550	3.32	9.01			***550***	3.29		9.00
560	3.13	8.82			***560***	3.10		8.81
570	2.94	8.63			***570***	2.90		8.62
580	2.74	8.43			***580***	2.70		8.42
590	2.35	8.04			***590***	2.32		8.03
600	1.94	7.64			***600***	1.91		7.63
650	9.45	7.32			***650***	9.44		7.32
1,000	7.67	5.55			***1,000***	7.65		5.54
1,350	7.65	5.54			***1,350***	7.63		5.53
1,700	7.56	5.46			***1,700***	7.54		5.45
2,050	7.52	5.42			***2,050***	7.50		5.41
2,400	7.53	5.44			***2,400***	7.51		5.43
2,750	7.33	5.25			***2,750***	7.31		5.24
3,100	7.18	5.10			***3,100***	7.16		5.10
3,450	7.06	4.99			***3,450***	7.04		4.98
3,800	6.90	4.84			***3,800***	6.88		4.83
4,150	6.74	4.68			***4,150***	6.72		4.67
4,500	6.66	4.60			***4,500***	6.64		4.59
4,850	6.60	4.55			***4,850***	6.58		4.54
5,200	6.55	4.50			***5,200***	6.53		4.49
5,550	6.51	4.46			***5,550***	6.49		4.45
5,900	6.47	4.42			***5,900***	6.45		4.41

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
6,250	6.38	4.34			6,250	6.36		4.33
6,600	6.46	4.42			6,600	6.45		4.41
6,950	6.46	4.42			6,950	6.45		4.42
7,300	6.43	4.40			7,300	6.42		4.39
7,650	6.40	4.36			7,650	6.38		4.36
8,000	6.35	4.31			8,000	6.33		4.30
8,350	6.32	4.28			8,350	6.30		4.27
8,700	6.29	4.25			8,700	6.27		4.25
9,050	6.24	4.21			9,050	6.22		4.20
9,400	6.20	4.16			9,400	6.18		4.15
9,750	6.17	4.14			9,750	6.16		4.13
10,100	6.14	4.11			10,100	6.13		4.10
10,450	6.12	4.09			10,450	6.10		4.08
10,800	6.10	4.06			10,800	6.08		4.06
11,150	6.07	4.04			11,150	6.05		4.03
11,500	6.07	4.03			11,500	6.05		4.03
11,850	6.03	4.00			11,850	6.01		3.99
12,200	6.02	3.99			12,200	6.00		3.98
12,550	6.00	3.97			12,550	5.98		3.96
12,900	5.99	3.95			12,900	5.97		3.95
13,250	5.97	3.94			13,250	5.95		3.93
13,600	5.95	3.92			13,600	5.93		3.91
13,950	5.92	3.89			13,950	5.90		3.88
14,300	5.87	3.84			14,300	5.86		3.83
14,650	5.85	3.82			14,650	5.84		3.82
15,000	5.82	3.79			15,000	5.80		3.78
15,350	5.79	3.75			15,350	5.77		3.75
15,700	5.77	3.74			15,700	5.75		3.73
16,050	5.74	3.71			16,050	5.72		3.70
16,400	5.71	3.68			16,400	5.70		3.68
16,750	5.68	3.65			16,750	5.66		3.64
17,100	5.67	3.64			17,100	5.65		3.63
17,450	5.65	3.62			17,450	5.63		3.61
17,800	5.64	3.61			17,800	5.62		3.60
18,150	5.61	3.58			18,150	5.59		3.57
18,500	5.60	3.57			18,500	5.58		3.56
18,850	5.59	3.56			18,850	5.57		3.55
19,200	5.56	3.53			19,200	5.54		3.52
19,550	5.53	3.50			19,550	5.52		3.49
19,900	5.54	3.51			19,900	5.52		3.50
20,250	5.52	3.49			20,250	5.50		3.48
20,600	5.52	3.49			20,600	5.50		3.48
20,950	5.49	3.45			20,950	5.47		3.45
21,300	5.48	3.45			21,300	5.47		3.44
21,650	5.49	3.46			21,650	5.47		3.45
22,000	5.48	3.45			22,000	5.46		3.44
22,350	5.47	3.44			22,350	5.45		3.43
22,700	5.47	3.44			22,700	5.45		3.43
23,050	5.43	3.40			23,050	5.41		3.39
23,400	5.42	3.39			23,400	5.40		3.38
23,750	5.43	3.40			23,750	5.41		3.39

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
24,100	5.41	3.38			***24,100***	5.40		3.38
24,450	5.40	3.37			***24,450***	5.38		3.36
24,800	5.38	3.35			***24,800***	5.37		3.34
25,150	5.37	3.34			***25,150***	5.36		3.34
25,500	5.37	3.34			***25,500***	5.35		3.33
25,850	5.36	3.33			***25,850***	5.34		3.32
26,200	5.35	3.32			***26,200***	5.33		3.31
26,550	5.35	3.32			***26,550***	5.33		3.31
26,900	5.34	3.31			***26,900***	5.32		3.30
27,250	5.32	3.29			***27,250***	5.30		3.28
27,600	5.32	3.29			***27,600***	5.30		3.28
27,950	5.31	3.28			***27,950***	5.29		3.27
28,300	5.28	3.25			***28,300***	5.26		3.24
28,650	5.28	3.25			***28,650***	5.26		3.24
29,000	5.28	3.24			***29,000***	5.26		3.24
29,350	5.27	3.24			***29,350***	5.25		3.23
29,700	5.25	3.21			***29,700***	5.23		3.21
30,050	5.26	3.22			***30,050***	5.24		3.22
30,400	5.22	3.19			***30,400***	5.21		3.18
30,750	5.22	3.19			***30,750***	5.20		3.18
31,100	5.22	3.19			***31,100***	5.20		3.18
31,450	5.20	3.17			***31,450***	5.18		3.16
31,800	5.19	3.16			***31,800***	5.18		3.16
32,150	5.19	3.16			***32,150***	5.17		3.15
32,500	5.16	3.13			***32,500***	5.14		3.12
32,850	5.16	3.13			***32,850***	5.14		3.12
33,200	5.15	3.12			***33,200***	5.14		3.12
33,550	5.15	3.12			***33,550***	5.13		3.11
33,900	5.14	3.10			***33,900***	5.12		3.10
34,250	5.13	3.10			***34,250***	5.11		3.09
34,600	5.13	3.10			***34,600***	5.11		3.09
34,950	5.11	3.08			***34,950***	5.09		3.07
35,300	5.10	3.07			***35,300***	5.09		3.06
35,650	5.09	3.06			***35,650***	5.07		3.05
36,000	5.08	3.05			***36,000***	5.06		3.04
36,350	5.07	3.04			***36,350***	5.05		3.03
36,700	5.05	3.02			***36,700***	5.04		3.01
37,050	5.06	3.02			***37,050***	5.04		3.02
37,400	5.04	3.01			***37,400***	5.02		3.00
37,750	5.03	3.00			***37,750***	5.01		2.99
38,100	5.04	3.01			***38,100***	5.02		3.00
38,450	5.04	3.01			***38,450***	5.02		3.00
38,800	5.04	3.00			***38,800***	5.02		3.00
39,150	5.04	3.00			***39,150***	5.02		3.00
39,500	5.04	3.01			***39,500***	5.02		3.00
39,850	5.03	3.00			***39,850***	5.01		2.99
40,200	5.04	3.01			***40,200***	5.02		3.00
40,550	5.03	2.99			***40,550***	5.01		2.99
40,900	5.04	3.00			***40,900***	5.02		3.00
41,250	5.03	3.00			***41,250***	5.02		2.99
41,600	5.02	2.99			***41,600***	5.00		2.98

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
41,950	5.04	3.01			***41,950***	5.02		3.00
42,300	5.02	2.99			***42,300***	5.01		2.99
42,650	5.04	3.01			***42,650***	5.02		3.00
43,000	5.04	3.00			***43,000***	5.02		3.00
43,350	5.04	3.01			***43,350***	5.02		3.00
43,700	5.02	2.99			***43,700***	5.00		2.98
44,050	5.03	2.99			***44,050***	5.01		2.99
44,400	5.03	3.00			***44,400***	5.01		2.99
44,750	5.03	3.00			***44,750***	5.01		2.99
45,100	5.03	3.00			***45,100***	5.01		2.99
45,450	5.03	3.00			***45,450***	5.01		2.99
45,800	5.04	3.01			***45,800***	5.02		3.00
46,150	5.03	2.99			***46,150***	5.01		2.99
46,500	5.04	3.00			***46,500***	5.02		3.00
46,850	5.03	3.00			***46,850***	5.01		2.99
47,200	5.03	3.00			***47,200***	5.02		2.99
47,550	5.03	3.00			***47,550***	5.02		3.00
47,900	5.03	3.00			***47,900***	5.01		2.99
48,250	5.03	3.00			***48,250***	5.01		2.99
48,600	5.03	3.00			***48,600***	5.01		2.99
48,950	5.03	2.99			***48,950***	5.01		2.99
49,300	5.03	3.00			***49,300***	5.01		2.99
49,650	5.03	3.00			***49,650***	5.01		2.99
50,000	5.02	2.99			***50,000***	5.01		2.99
50,350	5.03	3.00			***50,350***	5.01		2.99
50,700	5.02	2.99			***50,700***	5.01		2.98
51,050	5.02	2.99			***51,050***	5.00		2.98
51,400	5.01	2.98			***51,400***	4.99		2.97
51,750	5.01	2.98			***51,750***	4.99		2.97
52,100	5.00	2.97			***52,100***	4.98		2.96
52,450	4.99	2.96			***52,450***	4.97		2.95
52,800	5.00	2.97			***52,800***	4.98		2.96
53,150	5.00	2.97			***53,150***	4.98		2.96
53,500	4.99	2.96			***53,500***	4.98		2.96
53,850	4.99	2.96			***53,850***	4.97		2.95
54,200	4.99	2.96			***54,200***	4.97		2.95
54,550	4.98	2.95			***54,550***	4.96		2.94
54,900	4.97	2.94			***54,900***	4.95		2.93
55,250	4.99	2.96			***55,250***	4.97		2.95
55,600	4.97	2.94			***55,600***	4.95		2.93
55,950	4.97	2.94			***55,950***	4.95		2.93
56,300	4.96	2.93			***56,300***	4.94		2.92
56,650	4.97	2.94			***56,650***	4.95		2.93
57,000	4.95	2.92			***57,000***	4.93		2.91
57,350	4.95	2.92			***57,350***	4.93		2.91
57,700	4.96	2.93			***57,700***	4.94		2.92
58,050	4.94	2.91			***58,050***	4.93		2.90
58,400	4.95	2.92			***58,400***	4.93		2.91
58,750	4.93	2.90			***58,750***	4.91		2.89
59,100	4.93	2.90			***59,100***	4.92		2.90
59,450	4.94	2.91			***59,450***	4.92		2.90

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
59,800	4.92	2.89			59,800	4.90		2.88
60,150	4.93	2.90			60,150	4.91		2.89
60,500	4.92	2.89			60,500	4.90		2.88
60,850	4.92	2.89			60,850	4.90		2.88
61,200	4.92	2.89			61,200	4.90		2.88
61,550	4.90	2.87			61,550	4.88		2.86
61,900	4.91	2.88			61,900	4.89		2.87
62,250	4.91	2.88			62,250	4.89		2.87
62,600	4.90	2.87			62,600	4.88		2.86
62,950	4.90	2.87			62,950	4.88		2.86
63,300	4.90	2.87			63,300	4.88		2.86
63,650	4.89	2.86			63,650	4.87		2.85
64,000	4.88	2.85			64,000	4.86		2.84
64,350	4.89	2.86			64,350	4.87		2.85
64,700	4.89	2.85			64,700	4.87		2.85
65,050	4.87	2.84			65,050	4.85		2.83
65,400	4.88	2.85			65,400	4.86		2.84
65,750	4.87	2.84			65,750	4.85		2.83
66,100	4.86	2.83			66,100	4.84		2.82
66,450	4.86	2.83			66,450	4.84		2.82
66,800	4.86	2.83			66,800	4.84		2.82
67,150	4.86	2.82			67,150	4.84		2.82
67,500	4.85	2.82			67,500	4.83		2.81
67,850	4.86	2.82			67,850	4.84		2.82
68,200	4.86	2.82			68,200	4.84		2.82
68,550	4.86	2.82			68,550	4.84		2.82
68,900	4.85	2.81			68,900	4.83		2.81
69,250	4.84	2.81			69,250	4.82		2.80
69,600	4.85	2.81			69,600	4.83		2.81
69,950	4.83	2.80			69,950	4.81		2.79
70,300	4.85	2.82			70,300	4.83		2.81
70,650	4.84	2.80			70,650	4.82		2.80
71,000	4.83	2.80			71,000	4.81		2.79
71,350	4.84	2.81			71,350	4.82		2.80
71,700	4.82	2.79			71,700	4.80		2.78
72,050	4.84	2.80			72,050	4.82		2.80
72,400	4.82	2.79			72,400	4.80		2.78
72,750	4.82	2.79			72,750	4.80		2.78
73,100	4.82	2.79			73,100	4.80		2.78
73,450	4.81	2.78			73,450	4.79		2.77
73,800	4.82	2.79			73,800	4.80		2.78
74,150	4.81	2.78			74,150	4.79		2.77
74,500	4.82	2.79			74,500	4.80		2.78
74,850	4.81	2.78			74,850	4.79		2.77
75,200	4.82	2.79			75,200	4.80		2.78
75,550	4.81	2.78			75,550	4.80		2.78
75,900	4.83	2.80			75,900	4.81		2.79
76,250	4.82	2.79			76,250	4.80		2.78
76,600	4.81	2.78			76,600	4.79		2.77
76,950	4.82	2.79			76,950	4.80		2.78
77,300	4.82	2.79			77,300	4.80		2.78

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
77,650	4.82	2.79			77,650	4.81		2.79
78,000	4.82	2.79			78,000	4.81		2.79
78,350	4.83	2.80			78,350	4.81		2.79
78,700	4.81	2.78			78,700	4.79		2.77
79,050	4.82	2.79			79,050	4.80		2.78
79,400	4.81	2.78			79,400	4.79		2.77
79,750	4.82	2.78			79,750	4.80		2.78
80,100	4.82	2.79			80,100	4.80		2.78
80,450	4.82	2.79			80,450	4.80		2.78
80,800	4.82	2.79			80,800	4.80		2.78
81,150	4.82	2.78			81,150	4.80		2.78
81,500	4.81	2.78			81,500	4.79		2.77
81,850	4.81	2.78			81,850	4.79		2.77
82,200	4.80	2.77			82,200	4.78		2.76
82,550	4.80	2.77			82,550	4.78		2.76
82,900	4.79	2.76			82,900	4.77		2.75
83,250	4.79	2.76			83,250	4.77		2.75
83,600	4.78	2.75			83,600	4.76		2.74
83,950	4.78	2.75			83,950	4.76		2.74
84,300	4.77	2.74			84,300	4.75		2.73
84,650	4.77	2.74			84,650	4.75		2.73
85,000	4.76	2.73			85,000	4.74		2.73
85,350	4.76	2.73			85,350	4.74		2.72
85,700	4.76	2.73			85,700	4.74		2.72
86,050	4.75	2.72			86,050	4.73		2.72
86,400	4.75	2.72			86,400	4.73		2.71
86,750	4.75	2.72			86,750	4.73		2.71
87,100	4.74	2.71			87,100	4.72		2.71
87,450	4.74	2.71			87,450	4.72		2.70
87,800	4.74	2.71			87,800	4.72		2.70
88,150	4.73	2.70			88,150	4.71		2.70
88,500	4.73	2.70			88,500	4.71		2.69
88,850	4.73	2.70			88,850	4.71		2.69
89,200	4.72	2.69			89,200	4.70		2.69
89,550	4.72	2.69			89,550	4.70		2.68
89,900	4.72	2.69			89,900	4.70		2.68
90,250	4.71	2.68			90,250	4.69		2.67
90,600	4.71	2.68			90,600	4.69		2.67
90,950	4.70	2.68			90,950	4.69		2.67
91,300	4.70	2.67			91,300	4.68		2.66
91,650	4.70	2.67			91,650	4.68		2.66
92,000	4.70	2.67			92,000	4.68		2.66
92,350	4.69	2.66			92,350	4.67		2.66
92,700	4.69	2.66			92,700	4.67		2.65
93,050	4.69	2.66			93,050	4.67		2.65
93,400	4.68	2.65			93,400	4.67		2.65
93,750	4.68	2.65			93,750	4.66		2.64
94,100	4.68	2.65			94,100	4.66		2.64
94,450	4.67	2.65			94,450	4.66		2.64
94,800	4.67	2.64			94,800	4.65		2.64
95,150	4.67	2.64			95,150	4.65		2.63

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
95,500	4.67	2.64			***95,500***	4.65		2.63
95,850	4.66	2.63			***95,850***	4.64		2.63
96,200	4.66	2.63			***96,200***	4.64		2.62
96,550	4.66	2.63			***96,550***	4.64		2.62
96,900	4.65	2.63			***96,900***	4.64		2.62
97,250	4.65	2.62			***97,250***	4.63		2.62
97,600	4.65	2.62			***97,600***	4.63		2.61
97,950	4.65	2.62			***97,950***	4.63		2.61
98,300	4.64	2.61			***98,300***	4.62		2.61
98,650	4.64	2.61			***98,650***	4.62		2.60
99,000	4.64	2.61			***99,000***	4.62		2.60
99,350	4.63	2.61			***99,350***	4.62		2.60
99,700	4.63	2.60			***99,700***	4.61		2.60
100,050	4.63	2.60			***100,050***	4.61		2.59
100,400	4.63	2.60			***100,400***	4.61		2.59
100,750	4.62	2.60			***100,750***	4.60		2.59
101,100	4.62	2.59			***101,100***	4.60		2.58
101,450	4.62	2.59			***101,450***	4.60		2.58
101,800	4.61	2.59			***101,800***	4.60		2.58
102,150	4.61	2.58			***102,150***	4.59		2.58
102,500	4.61	2.58			***102,500***	4.59		2.57
102,850	4.61	2.58			***102,850***	4.59		2.57
103,200	4.60	2.58			***103,200***	4.58		2.57
103,550	4.60	2.57			***103,550***	4.58		2.57
103,900	4.60	2.57			***103,900***	4.58		2.56
104,250	4.59	2.57			***104,250***	4.58		2.56
104,600	4.59	2.56			***104,600***	4.57		2.56
104,950	4.59	2.56			***104,950***	4.57		2.55
105,300	4.58	2.56			***105,300***	4.57		2.55
105,650	4.58	2.55			***105,650***	4.56		2.55
106,000	4.58	2.55			***106,000***	4.56		2.54
106,350	4.57	2.55			***106,350***	4.56		2.54
106,700	4.57	2.54			***106,700***	4.55		2.54
107,050	4.57	2.54			***107,050***	4.55		2.53
107,400	4.56	2.54			***107,400***	4.55		2.53
107,750	4.56	2.54			***107,750***	4.54		2.53
108,100	4.56	2.53			***108,100***	4.54		2.52
108,450	4.55	2.53			***108,450***	4.54		2.52
108,800	4.55	2.53			***108,800***	4.53		2.52
109,150	4.55	2.52			***109,150***	4.53		2.51
109,500	4.55	2.52			***109,500***	4.53		2.51
109,850	4.54	2.52			***109,850***	4.52		2.51
110,200	4.54	2.51			***110,200***	4.52		2.51
110,550	4.54	2.51			***110,550***	4.52		2.50
110,900	4.53	2.51			***110,900***	4.52		2.50
111,250	4.53	2.51			***111,250***	4.51		2.50
111,600	4.53	2.50			***111,600***	4.51		2.50
111,950	4.53	2.50			***111,950***	4.51		2.49
112,300	4.53	2.50			***112,300***	4.51		2.49
112,650	4.52	2.50			***112,650***	4.50		2.49
113,000	4.52	2.50			***113,000***	4.50		2.49

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
113,350	4.52	2.49			113,350	4.50		2.49
113,700	4.52	2.49			113,700	4.50		2.48
114,050	4.51	2.49			114,050	4.50		2.48
114,400	4.51	2.49			114,400	4.49		2.48
114,750	4.51	2.48			114,750	4.49		2.48
115,100	4.51	2.48			115,100	4.49		2.47
115,450	4.50	2.48			115,450	4.49		2.47
115,800	4.50	2.48			115,800	4.48		2.47
116,150	4.50	2.48			116,150	4.48		2.47
116,500	4.50	2.47			116,500	4.48		2.47
116,850	4.50	2.47			116,850	4.48		2.46
117,200	4.49	2.47			117,200	4.48		2.46
117,550	4.49	2.47			117,550	4.48		2.46
117,900	4.49	2.47			117,900	4.47		2.46
118,250	4.49	2.47			118,250	4.47		2.46
118,600	4.49	2.46			118,600	4.47		2.46
118,950	4.49	2.46			118,950	4.47		2.45
119,300	4.49	2.46			119,300	4.47		2.45
119,650	4.48	2.46			119,650	4.47		2.45
120,000	4.48	2.46			120,000	4.46		2.45
120,350	4.48	2.46			120,350	4.46		2.45
120,700	4.48	2.45			120,700	4.46		2.45
121,050	4.48	2.45			121,050	4.46		2.45
121,400	4.48	2.45			121,400	4.46		2.44
121,750	4.47	2.45			121,750	4.46		2.44
122,100	4.47	2.45			122,100	4.45		2.44
122,450	4.47	2.45			122,450	4.45		2.44
122,800	4.47	2.45			122,800	4.45		2.44
123,150	4.47	2.44			123,150	4.45		2.44
123,500	4.46	2.44			123,500	4.45		2.43
123,850	4.46	2.44			123,850	4.44		2.43
124,200	4.46	2.43			124,200	4.44		2.43
124,550	4.46	2.43			124,550	4.44		2.42
124,900	4.45	2.43			124,900	4.44		2.42
125,250	4.45	2.43			125,250	4.43		2.42
125,600	4.45	2.42			125,600	4.43		2.42
125,950	4.44	2.42			125,950	4.43		2.41
126,300	4.44	2.42			126,300	4.42		2.41
126,650	4.44	2.42			126,650	4.42		2.41
127,000	4.44	2.41			127,000	4.42		2.41
127,350	4.43	2.41			127,350	4.42		2.40
127,700	4.43	2.41			127,700	4.41		2.40
128,050	4.43	2.40			128,050	4.41		2.40
128,400	4.42	2.40			128,400	4.40		2.39
128,750	4.42	2.39			128,750	4.40		2.39
129,100	4.41	2.39			129,100	4.39		2.38
129,450	4.41	2.39			129,450	4.39		2.38
129,800	4.41	2.38			129,800	4.39		2.37
130,150	4.40	2.38			130,150	4.38		2.37
130,500	4.40	2.37			130,500	4.38		2.37
130,850	4.39	2.37			130,850	4.38		2.36

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
131,200	4.39	2.37			131,200	4.37		2.36
131,550	4.39	2.36			131,550	4.37		2.36
131,900	4.38	2.36			131,900	4.36		2.35
132,250	4.38	2.36			132,250	4.36		2.35
132,600	4.38	2.35			132,600	4.36		2.35
132,950	4.37	2.35			132,950	4.35		2.34
133,300	4.37	2.35			133,300	4.35		2.34
133,650	4.36	2.34			133,650	4.35		2.33
134,000	4.36	2.34			134,000	4.34		2.33
134,350	4.36	2.33			134,350	4.34		2.33
134,700	4.35	2.33			134,700	4.34		2.32
135,050	4.35	2.33			135,050	4.33		2.32
135,400	4.35	2.32			135,400	4.33		2.32
135,750	4.34	2.32			135,750	4.32		2.31
136,100	4.34	2.32			136,100	4.32		2.31
136,450	4.34	2.31			136,450	4.32		2.31
136,800	4.33	2.31			136,800	4.31		2.30
137,150	4.33	2.31			137,150	4.31		2.30
137,500	4.33	2.30			137,500	4.31		2.30
137,850	4.32	2.30			137,850	4.30		2.29
138,200	4.32	2.30			138,200	4.30		2.29
138,550	4.31	2.29			138,550	4.30		2.28
138,900	4.31	2.29			138,900	4.29		2.28
139,250	4.31	2.29			139,250	4.29		2.28
139,600	4.30	2.28			139,600	4.29		2.27
139,950	4.30	2.28			139,950	4.28		2.27
140,300	4.30	2.28			140,300	4.28		2.27
140,650	4.29	2.27			140,650	4.28		2.26
141,000	4.29	2.27			141,000	4.27		2.26
141,350	4.29	2.26			141,350	4.27		2.26
141,700	4.28	2.26			141,700	4.27		2.25
142,050	4.28	2.26			142,050	4.26		2.25
142,400	4.28	2.26			142,400	4.26		2.25
142,750	4.27	2.25			142,750	4.26		2.25
143,100	4.27	2.25			143,100	4.25		2.24
143,450	4.27	2.25			143,450	4.25		2.24
143,800	4.27	2.24			143,800	4.25		2.24
144,150	4.26	2.24			144,150	4.25		2.23
144,500	4.26	2.24			144,500	4.24		2.23
144,850	4.26	2.24			144,850	4.24		2.23
145,200	4.25	2.23			145,200	4.24		2.23
145,550	4.25	2.23			145,550	4.23		2.22
145,900	4.25	2.23			145,900	4.23		2.22
146,250	4.25	2.22			146,250	4.23		2.22
146,600	4.24	2.22			146,600	4.22		2.21
146,950	4.24	2.22			146,950	4.22		2.21
147,300	4.24	2.22			147,300	4.22		2.21
147,650	4.23	2.21			147,650	4.22		2.21
148,000	4.23	2.21			148,000	4.21		2.20
148,350	4.23	2.21			148,350	4.21		2.20
148,700	4.23	2.20			148,700	4.21		2.20

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
149,050	4.22	2.20			149,050	4.21		2.19
149,400	4.22	2.20			149,400	4.20		2.19
149,750	4.22	2.20			149,750	4.20		2.19
150,100	4.22	2.19			150,100	4.20		2.19
150,450	4.21	2.19			150,450	4.20		2.18
150,800	4.21	2.19			150,800	4.19		2.18
151,150	4.21	2.19			151,150	4.19		2.18
151,500	4.21	2.18			151,500	4.19		2.18
151,850	4.20	2.18			151,850	4.19		2.17
152,200	4.20	2.18			152,200	4.18		2.17
152,550	4.20	2.18			152,550	4.18		2.17
152,900	4.20	2.17			152,900	4.18		2.17
153,250	4.19	2.17			153,250	4.17		2.16
153,600	4.19	2.17			153,600	4.17		2.16
153,950	4.19	2.17			153,950	4.17		2.16
154,300	4.19	2.16			154,300	4.17		2.16
154,650	4.18	2.16			154,650	4.17		2.16
155,000	4.18	2.16			155,000	4.16		2.15
155,350	4.18	2.16			155,350	4.16		2.15
155,700	4.18	2.16			155,700	4.16		2.15
156,050	4.18	2.16			156,050	4.16		2.15
156,400	4.17	2.15			156,400	4.16		2.15
156,750	4.17	2.15			156,750	4.15		2.14
157,100	4.17	2.15			157,100	4.15		2.14
157,450	4.17	2.15			157,450	4.15		2.14
157,800	4.17	2.15			157,800	4.15		2.14
158,150	4.16	2.14			158,150	4.15		2.14
158,500	4.16	2.14			158,500	4.14		2.14
158,850	4.16	2.14			158,850	4.14		2.13
159,200	4.16	2.14			159,200	4.14		2.13
159,550	4.16	2.14			159,550	4.14		2.13
159,900	4.16	2.14			159,900	4.14		2.13
160,250	4.15	2.13			160,250	4.14		2.13
160,600	4.15	2.13			160,600	4.13		2.12
160,950	4.15	2.13			160,950	4.13		2.12
161,300	4.15	2.13			161,300	4.13		2.12
161,650	4.14	2.12			161,650	4.13		2.12
162,000	4.14	2.12			162,000	4.12		2.11
162,350	4.14	2.12			162,350	4.12		2.11
162,700	4.14	2.12			162,700	4.12		2.11
163,050	4.13	2.11			163,050	4.11		2.10
163,400	4.13	2.11			163,400	4.11		2.10
163,750	4.13	2.11			163,750	4.11		2.10
164,100	4.12	2.10			164,100	4.11		2.10
164,450	4.12	2.10			164,450	4.10		2.09
164,800	4.12	2.10			164,800	4.10		2.09
165,150	4.12	2.10			165,150	4.10		2.09
165,500	4.11	2.09			165,500	4.09		2.08
165,850	4.11	2.09			165,850	4.09		2.08
166,200	4.11	2.09			166,200	4.09		2.08
166,550	4.10	2.08			166,550	4.09		2.08

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
166,900	4.10	2.08			***166,900***	4.08		2.07
167,250	4.10	2.08			***167,250***	4.08		2.07
167,600	4.09	2.07			***167,600***	4.08		2.07
167,950	4.09	2.07			***167,950***	4.07		2.06
168,300	4.09	2.07			***168,300***	4.07		2.06
168,650	4.08	2.06			***168,650***	4.07		2.06
169,000	4.08	2.06			***169,000***	4.06		2.05
169,350	4.08	2.06			***169,350***	4.06		2.05
169,700	4.07	2.05			***169,700***	4.06		2.05
170,050	4.07	2.05			***170,050***	4.05		2.04
170,400	4.07	2.05			***170,400***	4.05		2.04
170,750	4.06	2.04			***170,750***	4.05		2.04
171,100	4.06	2.04			***171,100***	4.04		2.03
171,450	4.06	2.04			***171,450***	4.04		2.03
171,800	4.05	2.03			***171,800***	4.04		2.03
172,150	4.05	2.03			***172,150***	4.03		2.02
172,500	4.05	2.03			***172,500***	4.03		2.02
172,850	4.04	2.02			***172,850***	4.03		2.02
173,200	4.04	2.02			***173,200***	4.02		2.01
173,550	4.04	2.02			***173,550***	4.02		2.01
173,900	4.04	2.02			***173,900***	4.02		2.01
174,250	4.03	2.01			***174,250***	4.02		2.01
174,600	4.03	2.01			***174,600***	4.01		2.00
174,950	4.03	2.01			***174,950***	4.01		2.00
175,300	4.03	2.01			***175,300***	4.01		2.00
175,650	4.02	2.01			***175,650***	4.01		2.00
176,000	4.02	2.00			***176,000***	4.00		2.00
176,350	4.02	2.00			***176,350***	4.00		1.99
176,700	4.02	2.00			***176,700***	4.00		1.99
177,050	4.01	2.00			***177,050***	4.00		1.99
177,400	4.01	1.99			***177,400***	3.99		1.99
177,750	4.01	1.99			***177,750***	3.99		1.98
178,100	4.01	1.99			***178,100***	3.99		1.98
178,450	4.01	1.99			***178,450***	3.99		1.98
178,800	4.00	1.98			***178,800***	3.99		1.98
179,150	4.00	1.98			***179,150***	3.98		1.97
179,500	4.00	1.98			***179,500***	3.98		1.97
179,850	4.00	1.98			***179,850***	3.98		1.97
180,200	3.99	1.98			***180,200***	3.98		1.97
180,550	3.99	1.97			***180,550***	3.97		1.97
180,900	3.99	1.97			***180,900***	3.97		1.96
181,250	3.99	1.97			***181,250***	3.97		1.96
181,600	3.99	1.97			***181,600***	3.97		1.96
181,950	3.99	1.97			***181,950***	3.97		1.96
182,300	3.98	1.96			***182,300***	3.97		1.96
182,650	3.98	1.96			***182,650***	3.96		1.96
183,000	3.98	1.96			***183,000***	3.96		1.95
183,350	3.98	1.96			***183,350***	3.96		1.95
183,700	3.98	1.96			***183,700***	3.96		1.95
184,050	3.97	1.96			***184,050***	3.96		1.95
184,400	3.97	1.95			***184,400***	3.95		1.95

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
184,750	3.97	1.95			184,750	3.95		1.94
185,100	3.97	1.95			185,100	3.95		1.94
185,450	3.97	1.95			185,450	3.95		1.94
185,800	3.96	1.95			185,800	3.95		1.94
186,150	3.96	1.94			186,150	3.94		1.94
186,500	3.96	1.94			186,500	3.94		1.93
186,850	3.95	1.94			186,850	3.94		1.93
187,200	3.95	1.93			187,200	3.93		1.92
187,550	3.95	1.93			187,550	3.93		1.92
187,900	3.94	1.92			187,900	3.92		1.92
188,250	3.94	1.92			188,250	3.92		1.91
188,600	3.94	1.92			188,600	3.92		1.91
188,950	3.93	1.91			188,950	3.91		1.91
189,300	3.93	1.91			189,300	3.91		1.90
189,650	3.92	1.91			189,650	3.91		1.90
190,000	3.92	1.90			190,000	3.90		1.89
190,350	3.92	1.90			190,350	3.90		1.89
190,700	3.91	1.89			190,700	3.89		1.89
191,050	3.91	1.89			191,050	3.89		1.88
191,400	3.91	1.89			191,400	3.89		1.88
191,750	3.90	1.88			191,750	3.88		1.88
192,100	3.90	1.88			192,100	3.88		1.87
192,450	3.89	1.88			192,450	3.88		1.87
192,800	3.89	1.87			192,800	3.87		1.87
193,150	3.89	1.87			193,150	3.87		1.86
193,500	3.89	1.87			193,500	3.87		1.86
193,850	3.89	1.87			193,850	3.87		1.86
194,200	3.88	1.87			194,200	3.86		1.86
194,550	3.88	1.86			194,550	3.86		1.86
194,900	3.88	1.86			194,900	3.86		1.85
195,250	3.88	1.86			195,250	3.86		1.85
195,600	3.87	1.86			195,600	3.86		1.85
195,950	3.87	1.85			195,950	3.85		1.85
196,300	3.87	1.85			196,300	3.85		1.84
196,650	3.87	1.85			196,650	3.85		1.84
197,000	3.86	1.85			197,000	3.85		1.84
197,350	3.86	1.84			197,350	3.84		1.84
197,700	3.86	1.84			197,700	3.84		1.83
198,050	3.86	1.84			198,050	3.84		1.83
198,400	3.85	1.84			198,400	3.84		1.83
198,750	3.85	1.83			198,750	3.83		1.83
199,100	3.85	1.83			199,100	3.83		1.82
199,450	3.85	1.83			199,450	3.83		1.82
199,800	3.84	1.83			199,800	3.83		1.82
200,150	3.84	1.82			200,150	3.82		1.82
200,500	3.84	1.82			200,500	3.82		1.81
200,850	3.84	1.82			200,850	3.82		1.81
201,200	3.83	1.82			201,200	3.81		1.81
201,550	3.83	1.81			201,550	3.81		1.81
201,900	3.83	1.81			201,900	3.81		1.80
202,250	3.82	1.81			202,250	3.81		1.80

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
202,600	3.82	1.80			202,600	3.80		1.80
202,950	3.82	1.80			202,950	3.80		1.79
203,300	3.82	1.80			203,300	3.80		1.79
203,650	3.81	1.80			203,650	3.80		1.79
204,000	3.81	1.79			204,000	3.79		1.79
204,350	3.81	1.79			204,350	3.79		1.78
204,700	3.81	1.79			204,700	3.79		1.78
205,050	3.80	1.79			205,050	3.78		1.78
205,400	3.80	1.78			205,400	3.78		1.78
205,750	3.80	1.78			205,750	3.78		1.77
206,100	3.80	1.78			206,100	3.78		1.77
206,450	3.79	1.78			206,450	3.78		1.77
206,800	3.79	1.78			206,800	3.77		1.77
207,150	3.79	1.77			207,150	3.77		1.77
207,500	3.79	1.77			207,500	3.77		1.76
207,850	3.79	1.77			207,850	3.77		1.76
208,200	3.78	1.77			208,200	3.77		1.76
208,550	3.78	1.77			208,550	3.76		1.76
208,900	3.78	1.76			208,900	3.76		1.76
209,250	3.78	1.76			209,250	3.76		1.75
209,600	3.78	1.76			209,600	3.76		1.75
209,950	3.77	1.76			209,950	3.76		1.75
210,300	3.77	1.76			210,300	3.75		1.75
210,650	3.77	1.75			210,650	3.75		1.75
211,000	3.77	1.75			211,000	3.75		1.74
211,350	3.77	1.75			211,350	3.75		1.74
211,700	3.76	1.75			211,700	3.74		1.74
212,050	3.76	1.74			212,050	3.74		1.74
212,400	3.76	1.74			212,400	3.74		1.73
212,750	3.76	1.74			212,750	3.74		1.73
213,100	3.75	1.74			213,100	3.74		1.73
213,450	3.75	1.74			213,450	3.73		1.73
213,800	3.75	1.73			213,800	3.73		1.73
214,150	3.75	1.73			214,150	3.73		1.72
214,500	3.74	1.73			214,500	3.73		1.72
214,850	3.74	1.73			214,850	3.72		1.72
215,200	3.74	1.72			215,200	3.72		1.72
215,550	3.74	1.72			215,550	3.72		1.71
215,900	3.74	1.72			215,900	3.72		1.71
216,250	3.73	1.72			216,250	3.71		1.71
216,600	3.73	1.71			216,600	3.71		1.71
216,950	3.73	1.71			216,950	3.71		1.70
217,300	3.73	1.71			217,300	3.71		1.70
217,650	3.72	1.71			217,650	3.71		1.70
218,000	3.72	1.71			218,000	3.70		1.70
218,350	3.72	1.70			218,350	3.70		1.70
218,700	3.72	1.70			218,700	3.70		1.69
219,050	3.71	1.70			219,050	3.70		1.69
219,400	3.71	1.70			219,400	3.69		1.69
219,750	3.71	1.69			219,750	3.69		1.69
220,100	3.71	1.69			220,100	3.69		1.69

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
220,450	3.71	1.69			220,450	3.69		1.68
220,800	3.70	1.69			220,800	3.69		1.68
221,150	3.70	1.69			221,150	3.68		1.68
221,500	3.70	1.68			221,500	3.68		1.68
221,850	3.70	1.68			221,850	3.68		1.67
222,200	3.70	1.68			222,200	3.68		1.67
222,550	3.69	1.68			222,550	3.67		1.67
222,900	3.69	1.68			222,900	3.67		1.67
223,250	3.69	1.67			223,250	3.67		1.67
223,600	3.69	1.67			223,600	3.67		1.66
223,950	3.68	1.67			223,950	3.67		1.66
224,300	3.68	1.67			224,300	3.66		1.66
224,650	3.68	1.66			224,650	3.66		1.66
225,000	3.68	1.66			225,000	3.66		1.65
225,350	3.67	1.66			225,350	3.66		1.65
225,700	3.67	1.66			225,700	3.65		1.65
226,050	3.67	1.65			226,050	3.65		1.65
226,400	3.67	1.65			226,400	3.65		1.64
226,750	3.66	1.65			226,750	3.64		1.64
227,100	3.66	1.64			227,100	3.64		1.64
227,450	3.65	1.64			227,450	3.64		1.63
227,800	3.65	1.64			227,800	3.63		1.63
228,150	3.65	1.63			228,150	3.63		1.62
228,500	3.64	1.63			228,500	3.63		1.62
228,850	3.64	1.63			228,850	3.62		1.62
229,200	3.64	1.62			229,200	3.62		1.61
229,550	3.63	1.62			229,550	3.61		1.61
229,900	3.63	1.61			229,900	3.61		1.61
230,250	3.63	1.61			230,250	3.61		1.60
230,600	3.62	1.61			230,600	3.60		1.60
230,950	3.62	1.60			230,950	3.60		1.60
231,300	3.62	1.60			231,300	3.60		1.59
231,650	3.61	1.60			231,650	3.59		1.59
232,000	3.61	1.60			232,000	3.59		1.59
232,350	3.61	1.59			232,350	3.59		1.59
232,700	3.60	1.59			232,700	3.59		1.58
233,050	3.60	1.59			233,050	3.58		1.58
233,400	3.60	1.58			233,400	3.58		1.58
233,750	3.59	1.58			233,750	3.58		1.57
234,100	3.59	1.58			234,100	3.57		1.57
234,450	3.59	1.57			234,450	3.57		1.57
234,800	3.59	1.57			234,800	3.57		1.56
235,150	3.58	1.57			235,150	3.56		1.56
235,500	3.58	1.56			235,500	3.56		1.56
235,850	3.58	1.56			235,850	3.56		1.55
236,200	3.57	1.56			236,200	3.55		1.55
236,550	3.57	1.56			236,550	3.55		1.55
236,900	3.57	1.55			236,900	3.55		1.54
237,250	3.56	1.55			237,250	3.54		1.54
237,600	3.56	1.54			237,600	3.54		1.54
237,950	3.55	1.54			237,950	3.54		1.53

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
238,300	3.55	1.54			238,300	3.53		1.53
238,650	3.55	1.53			238,650	3.53		1.53
239,000	3.54	1.53			239,000	3.52		1.52
239,350	3.54	1.53			239,350	3.52		1.52
239,700	3.54	1.52			239,700	3.52		1.51
240,050	3.53	1.52			240,050	3.51		1.51
240,400	3.53	1.51			240,400	3.51		1.51
240,750	3.52	1.51			240,750	3.51		1.50
241,100	3.52	1.51			241,100	3.50		1.50
241,450	3.52	1.50			241,450	3.50		1.50
241,800	3.51	1.50			241,800	3.49		1.49
242,150	3.51	1.50			242,150	3.49		1.49
242,500	3.51	1.49			242,500	3.49		1.48
242,850	3.50	1.49			242,850	3.48		1.48
243,200	3.50	1.49			243,200	3.48		1.48
243,550	3.50	1.48			243,550	3.48		1.48
243,900	3.49	1.48			243,900	3.48		1.47
244,250	3.49	1.48			244,250	3.47		1.47
244,600	3.49	1.48			244,600	3.47		1.47
244,950	3.49	1.47			244,950	3.47		1.46
245,300	3.48	1.47			245,300	3.46		1.46
245,650	3.48	1.47			245,650	3.46		1.46
246,000	3.48	1.46			246,000	3.46		1.46
246,350	3.47	1.46			246,350	3.46		1.45
246,700	3.47	1.46			246,700	3.45		1.45
247,050	3.47	1.46			247,050	3.45		1.45
247,400	3.46	1.45			247,400	3.45		1.44
247,750	3.46	1.45			247,750	3.44		1.44
248,100	3.46	1.45			248,100	3.44		1.44
248,450	3.46	1.44			248,450	3.44		1.44
248,800	3.45	1.44			248,800	3.43		1.43
249,150	3.45	1.44			249,150	3.43		1.43
249,500	3.45	1.44			249,500	3.43		1.43
249,850	3.44	1.43			249,850	3.43		1.43
250,200	3.44	1.43			250,200	3.42		1.42
250,550	3.44	1.43			250,550	3.42		1.42
250,900	3.44	1.42			250,900	3.42		1.42
251,250	3.43	1.42			251,250	3.42		1.41
251,600	3.43	1.42			251,600	3.41		1.41
251,950	3.43	1.42			251,950	3.41		1.41
252,300	3.43	1.41			252,300	3.41		1.41
252,650	3.42	1.41			252,650	3.40		1.40
253,000	3.42	1.41			253,000	3.40		1.40
253,350	3.42	1.41			253,350	3.40		1.40
253,700	3.41	1.40			253,700	3.40		1.39
254,050	3.41	1.40			254,050	3.39		1.39
254,400	3.41	1.40			254,400	3.39		1.39
254,750	3.41	1.39			254,750	3.39		1.39
255,100	3.40	1.39			255,100	3.38		1.38
255,450	3.40	1.39			255,450	3.38		1.38
255,800	3.40	1.39			255,800	3.38		1.38

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
256,150	3.39	1.38			256,150	3.37		1.37
256,500	3.39	1.38			256,500	3.37		1.37
256,850	3.39	1.37			256,850	3.37		1.37
257,200	3.38	1.37			257,200	3.36		1.36
257,550	3.38	1.37			257,550	3.36		1.36
257,900	3.38	1.36			257,900	3.36		1.36
258,250	3.37	1.36			258,250	3.35		1.35
258,600	3.37	1.36			258,600	3.35		1.35
258,950	3.37	1.35			258,950	3.35		1.35
259,300	3.36	1.35			259,300	3.34		1.34
259,650	3.36	1.35			259,650	3.34		1.34
260,000	3.35	1.34			260,000	3.34		1.34
260,350	3.35	1.34			260,350	3.33		1.33
260,700	3.35	1.34			260,700	3.33		1.33
261,050	3.34	1.33			261,050	3.33		1.33
261,400	3.34	1.33			261,400	3.32		1.32
261,750	3.34	1.33			261,750	3.32		1.32
262,100	3.33	1.32			262,100	3.32		1.32
262,450	3.33	1.32			262,450	3.31		1.31
262,800	3.33	1.32			262,800	3.31		1.31
263,150	3.32	1.31			263,150	3.31		1.31
263,500	3.32	1.31			263,500	3.30		1.30
263,850	3.32	1.31			263,850	3.30		1.30
264,200	3.32	1.31			264,200	3.30		1.30
264,550	3.31	1.30			264,550	3.29		1.29
264,900	3.31	1.30			264,900	3.29		1.29
265,250	3.31	1.30			265,250	3.29		1.29
265,600	3.30	1.29			265,600	3.28		1.29
265,950	3.30	1.29			265,950	3.28		1.28
266,300	3.30	1.29			266,300	3.28		1.28
266,650	3.29	1.28			266,650	3.28		1.28
267,000	3.29	1.28			267,000	3.27		1.27
267,350	3.29	1.28			267,350	3.27		1.27
267,700	3.28	1.27			267,700	3.27		1.27
268,050	3.28	1.27			268,050	3.26		1.26
268,400	3.28	1.27			268,400	3.26		1.26
268,750	3.27	1.26			268,750	3.26		1.26
269,100	3.27	1.26			269,100	3.25		1.25
269,450	3.27	1.26			269,450	3.25		1.25
269,800	3.26	1.25			269,800	3.25		1.25
270,150	3.26	1.25			270,150	3.24		1.24
270,500	3.26	1.25			270,500	3.24		1.24
270,850	3.25	1.24			270,850	3.24		1.24
271,200	3.25	1.24			271,200	3.23		1.23
271,550	3.25	1.24			271,550	3.23		1.23
271,900	3.24	1.23			271,900	3.23		1.23
272,250	3.24	1.23			272,250	3.22		1.22
272,600	3.24	1.23			272,600	3.22		1.22
272,950	3.23	1.22			272,950	3.22		1.22
273,300	3.23	1.22			273,300	3.21		1.21
273,650	3.23	1.22			273,650	3.21		1.21

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
274,000	3.22	1.21			274,000	3.21		1.21
274,350	3.22	1.21			274,350	3.20		1.20
274,700	3.22	1.21			274,700	3.20		1.20
275,050	3.22	1.21			275,050	3.20		1.20
275,400	3.21	1.20			275,400	3.19		1.20
275,750	3.21	1.20			275,750	3.19		1.19
276,100	3.21	1.20			276,100	3.19		1.19
276,450	3.20	1.20			276,450	3.19		1.19
276,800	3.20	1.19			276,800	3.18		1.19
277,150	3.20	1.19			277,150	3.18		1.18
277,500	3.20	1.19			277,500	3.18		1.18
277,850	3.19	1.19			277,850	3.18		1.18
278,200	3.19	1.18			278,200	3.17		1.17
278,550	3.19	1.18			278,550	3.17		1.17
278,900	3.19	1.18			278,900	3.17		1.17
279,250	3.18	1.17			279,250	3.16		1.17
279,600	3.18	1.17			279,600	3.16		1.16
279,950	3.18	1.17			279,950	3.16		1.16
280,300	3.17	1.17			280,300	3.16		1.16
280,650	3.17	1.16			280,650	3.15		1.16
281,000	3.17	1.16			281,000	3.15		1.15
281,350	3.17	1.16			281,350	3.15		1.15
281,700	3.16	1.15			281,700	3.14		1.15
282,050	3.16	1.15			282,050	3.14		1.14
282,400	3.16	1.15			282,400	3.14		1.14
282,750	3.15	1.14			282,750	3.13		1.14
283,100	3.15	1.14			283,100	3.13		1.13
283,450	3.15	1.14			283,450	3.13		1.13
283,800	3.14	1.13			283,800	3.12		1.13
284,150	3.14	1.13			284,150	3.12		1.12
284,500	3.14	1.13			284,500	3.12		1.12
284,850	3.13	1.12			284,850	3.11		1.12
285,200	3.13	1.12			285,200	3.11		1.11
285,550	3.13	1.12			285,550	3.11		1.11
285,900	3.12	1.11			285,900	3.10		1.11
286,250	3.12	1.11			286,250	3.10		1.10
286,600	3.12	1.11			286,600	3.10		1.10
286,950	3.11	1.11			286,950	3.09		1.10
287,300	3.11	1.10			287,300	3.09		1.10
287,650	3.11	1.10			287,650	3.09		1.09
288,000	3.11	1.10			288,000	3.09		1.09
288,350	3.10	1.10			288,350	3.08		1.09
288,700	3.10	1.09			288,700	3.08		1.09
289,050	3.10	1.09			289,050	3.08		1.08
289,400	3.10	1.09			289,400	3.08		1.08
289,750	3.09	1.09			289,750	3.07		1.08
290,100	3.09	1.08			290,100	3.07		1.08
290,450	3.09	1.08			290,450	3.07		1.07
290,800	3.09	1.08			290,800	3.07		1.07
291,150	3.08	1.08			291,150	3.06		1.07
291,500	3.08	1.07			291,500	3.06		1.07

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
291,850	3.08	1.07			291,850	3.06		1.06
292,200	3.08	1.07			292,200	3.06		1.06
292,550	3.07	1.07			292,550	3.05		1.06
292,900	3.07	1.06			292,900	3.05		1.06
293,250	3.07	1.06			293,250	3.05		1.05
293,600	3.06	1.06			293,600	3.05		1.05
293,950	3.06	1.06			293,950	3.04		1.05
294,300	3.06	1.05			294,300	3.04		1.04
294,650	3.06	1.05			294,650	3.04		1.04
295,000	3.05	1.05			295,000	3.04		1.04
295,350	3.05	1.04			295,350	3.03		1.04
295,700	3.05	1.04			295,700	3.03		1.03
296,050	3.04	1.04			296,050	3.03		1.03
296,400	3.04	1.04			296,400	3.02		1.03
296,750	3.04	1.03			296,750	3.02		1.03
297,100	3.04	1.03			297,100	3.02		1.02
297,450	3.03	1.03			297,450	3.02		1.02
297,800	3.03	1.02			297,800	3.01		1.02
298,150	3.03	1.02			298,150	3.01		1.01
298,500	3.03	1.02			298,500	3.01		1.01
298,850	3.02	1.02			298,850	3.00		1.01
299,200	3.02	1.01			299,200	3.00		1.01
299,550	3.02	1.01			299,550	3.00		1.00
299,900	3.01	1.01			299,900	3.00		1.00
300,250	3.01	1.01			300,250	2.99		1.00
300,600	3.01	1.00			300,600	2.99		1.00
300,950	3.01	1.00			300,950	2.99		0.99
301,300	3.00	1.00			301,300	2.99		0.99
301,650	3.00	1.00			301,650	2.98		0.99
302,000	3.00	0.99			302,000	2.98		0.99
302,350	3.00	0.99			302,350	2.98		0.98
302,700	2.99	0.99			302,700	2.98		0.98
303,050	2.99	0.99			303,050	2.97		0.98
303,400	2.99	0.98			303,400	2.97		0.98
303,750	2.99	0.98			303,750	2.97		0.97
304,100	2.99	0.98			304,100	2.97		0.97
304,450	2.98	0.98			304,450	2.96		0.97
304,800	2.98	0.97			304,800	2.96		0.97
305,150	2.98	0.97			305,150	2.96		0.96
305,500	2.98	0.97			305,500	2.96		0.96
305,850	2.97	0.97			305,850	2.95		0.96
306,200	2.97	0.96			306,200	2.95		0.96
306,550	2.97	0.96			306,550	2.95		0.95
306,900	2.96	0.96			306,900	2.94		0.95
307,250	2.96	0.95			307,250	2.94		0.95
307,600	2.96	0.95			307,600	2.94		0.94
307,950	2.95	0.95			307,950	2.94		0.94
308,300	2.95	0.95			308,300	2.93		0.94
308,650	2.95	0.94			308,650	2.93		0.94
309,000	2.94	0.94			309,000	2.93		0.93
309,350	2.94	0.94			309,350	2.92		0.93

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
309,700	2.94	0.93			309,700	2.92		0.93
310,050	2.94	0.93			310,050	2.92		0.92
310,400	2.93	0.93			310,400	2.91		0.92
310,750	2.93	0.92			310,750	2.91		0.92
311,100	2.93	0.92			311,100	2.91		0.91
311,450	2.92	0.92			311,450	2.90		0.91
311,800	2.92	0.92			311,800	2.90		0.91
312,150	2.92	0.91			312,150	2.90		0.90
312,500	2.91	0.91			312,500	2.90		0.90
312,850	2.91	0.91			312,850	2.89		0.90
313,200	2.91	0.91			313,200	2.89		0.90
313,550	2.91	0.90			313,550	2.89		0.90
313,900	2.90	0.90			313,900	2.89		0.89
314,250	2.90	0.90			314,250	2.88		0.89
314,600	2.90	0.90			314,600	2.88		0.89
314,950	2.90	0.89			314,950	2.88		0.89
315,300	2.90	0.89			315,300	2.88		0.88
315,650	2.89	0.89			315,650	2.87		0.88
316,000	2.89	0.89			316,000	2.87		0.88
316,350	2.89	0.88			316,350	2.87		0.88
316,700	2.89	0.88			316,700	2.87		0.87
317,050	2.88	0.88			317,050	2.87		0.87
317,400	2.88	0.88			317,400	2.86		0.87
317,750	2.88	0.87			317,750	2.86		0.87
318,100	2.88	0.87			318,100	2.86		0.87
318,450	2.87	0.87			318,450	2.86		0.86
318,800	2.87	0.87			318,800	2.85		0.86
319,150	2.87	0.86			319,150	2.85		0.86
319,500	2.86	0.86			319,500	2.85		0.85
319,850	2.86	0.86			319,850	2.84		0.85
320,200	2.86	0.86			320,200	2.84		0.85
320,550	2.86	0.85			320,550	2.84		0.84
320,900	2.85	0.85			320,900	2.83		0.84
321,250	2.85	0.85			321,250	2.83		0.84
321,600	2.85	0.84			321,600	2.83		0.84
321,950	2.84	0.84			321,950	2.82		0.83
322,300	2.84	0.84			322,300	2.82		0.83
322,650	2.84	0.83			322,650	2.82		0.83
323,000	2.83	0.83			323,000	2.82		0.82
323,350	2.83	0.83			323,350	2.81		0.82
323,700	2.83	0.83			323,700	2.81		0.82
324,050	2.83	0.82			324,050	2.81		0.81
324,400	2.82	0.82			324,400	2.80		0.81
324,750	2.82	0.82			324,750	2.80		0.81
325,100	2.82	0.82			325,100	2.80		0.81
325,450	2.82	0.81			325,450	2.80		0.81
325,800	2.82	0.81			325,800	2.80		0.81
326,150	2.82	0.81			326,150	2.80		0.81
326,500	2.81	0.81			326,500	2.80		0.80
326,850	2.81	0.81			326,850	2.79		0.80
327,200	2.81	0.81			327,200	2.79		0.80

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
327,550	2.81	0.81			327,550	2.79		0.80
327,900	2.81	0.81			327,900	2.79		0.80
328,250	2.81	0.81			328,250	2.79		0.80
328,600	2.81	0.81			328,600	2.79		0.80
328,950	2.81	0.80			328,950	2.79		0.80
329,300	2.81	0.80			329,300	2.79		0.80
329,650	2.80	0.80			329,650	2.79		0.79
330,000	2.80	0.80			330,000	2.78		0.79
330,350	2.80	0.80			330,350	2.78		0.79
330,700	2.80	0.80			330,700	2.78		0.79
331,050	2.80	0.80			331,050	2.78		0.79
331,400	2.80	0.79			331,400	2.78		0.79
331,750	2.79	0.79			331,750	2.78		0.78
332,100	2.79	0.79			332,100	2.77		0.78
332,450	2.79	0.79			332,450	2.77		0.78
332,800	2.79	0.78			332,800	2.77		0.78
333,150	2.78	0.78			333,150	2.77		0.77
333,500	2.78	0.78			333,500	2.76		0.77
333,850	2.78	0.78			333,850	2.76		0.77
334,200	2.78	0.77			334,200	2.76		0.77
334,550	2.77	0.77			334,550	2.76		0.76
334,900	2.77	0.77			334,900	2.75		0.76
335,250	2.77	0.77			335,250	2.75		0.76
335,600	2.77	0.76			335,600	2.75		0.76
335,950	2.76	0.76			335,950	2.75		0.75
336,300	2.76	0.76			336,300	2.74		0.75
336,650	2.76	0.76			336,650	2.74		0.75
337,000	2.76	0.75			337,000	2.74		0.75
337,350	2.75	0.75			337,350	2.73		0.74
337,700	2.75	0.75			337,700	2.73		0.74
338,050	2.75	0.75			338,050	2.73		0.74
338,400	2.74	0.74			338,400	2.73		0.74
338,750	2.74	0.74			338,750	2.72		0.73
339,100	2.74	0.74			339,100	2.72		0.73
339,450	2.74	0.73			339,450	2.72		0.73
339,800	2.73	0.73			339,800	2.71		0.72
340,150	2.73	0.73			340,150	2.71		0.72
340,500	2.73	0.72			340,500	2.71		0.72
340,850	2.72	0.72			340,850	2.70		0.71
341,200	2.72	0.72			341,200	2.70		0.71
341,550	2.71	0.71			341,550	2.70		0.71
341,900	2.71	0.71			341,900	2.69		0.70
342,250	2.71	0.71			342,250	2.69		0.70
342,600	2.70	0.70			342,600	2.68		0.69
342,950	2.70	0.70			342,950	2.68		0.69
343,300	2.70	0.70			343,300	2.68		0.69
343,650	2.69	0.69			343,650	2.67		0.68
344,000	2.69	0.69			344,000	2.67		0.68
344,350	2.69	0.69			344,350	2.67		0.68
344,700	2.68	0.68			344,700	2.67		0.68
345,050	2.68	0.68			345,050	2.66		0.67

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
345,400	2.68	0.68			345,400	2.66		0.67
345,750	2.67	0.67			345,750	2.66		0.67
346,100	2.67	0.67			346,100	2.65		0.66
346,450	2.67	0.67			346,450	2.65		0.66
346,800	2.67	0.67			346,800	2.65		0.66
347,150	2.66	0.66			347,150	2.64		0.65
347,500	2.66	0.66			347,500	2.64		0.65
347,850	2.66	0.66			347,850	2.64		0.65
348,200	2.65	0.65			348,200	2.63		0.65
348,550	2.65	0.65			348,550	2.63		0.64
348,900	2.65	0.65			348,900	2.63		0.64
349,250	2.64	0.64			349,250	2.63		0.64
349,600	2.64	0.64			349,600	2.62		0.63
349,950	2.64	0.64			349,950	2.62		0.63
350,300	2.64	0.64			350,300	2.62		0.63
350,650	2.64	0.64			350,650	2.62		0.63
351,000	2.63	0.64			351,000	2.62		0.63
351,350	2.63	0.63			351,350	2.62		0.63
351,700	2.63	0.63			351,700	2.61		0.63
352,050	2.63	0.63			352,050	2.61		0.62
352,400	2.63	0.63			352,400	2.61		0.62
352,750	2.63	0.63			352,750	2.61		0.62
353,100	2.63	0.63			353,100	2.61		0.62
353,450	2.63	0.63			353,450	2.61		0.62
353,800	2.62	0.63			353,800	2.61		0.62
354,150	2.62	0.62			354,150	2.60		0.62
354,500	2.62	0.62			354,500	2.60		0.62
354,850	2.62	0.62			354,850	2.60		0.61
355,200	2.62	0.62			355,200	2.60		0.61
355,550	2.62	0.62			355,550	2.60		0.61
355,900	2.62	0.62			355,900	2.60		0.61
356,250	2.62	0.62			356,250	2.60		0.61
356,600	2.62	0.62			356,600	2.60		0.61
356,950	2.62	0.63			356,950	2.61		0.62
357,300	2.63	0.63			357,300	2.61		0.62
357,650	2.63	0.63			357,650	2.61		0.62
358,000	2.63	0.64			358,000	2.62		0.63
358,350	2.64	0.64			358,350	2.62		0.63
358,700	2.64	0.64			358,700	2.62		0.63
359,050	2.64	0.65			359,050	2.63		0.64
359,400	2.65	0.65			359,400	2.63		0.64
359,750	2.65	0.65			359,750	2.63		0.65
360,100	2.65	0.66			360,100	2.64		0.65
360,450	2.66	0.66			360,450	2.64		0.65
360,800	2.66	0.66			360,800	2.64		0.66
361,150	2.66	0.67			361,150	2.65		0.66
361,500	2.67	0.67			361,500	2.65		0.66
361,850	2.67	0.67			361,850	2.65		0.67
362,200	2.67	0.68			362,200	2.66		0.67
362,550	2.68	0.68			362,550	2.66		0.67
362,900	2.68	0.68			362,900	2.66		0.68

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
363,250	2.68	0.69			363,250	2.67		0.68
363,600	2.69	0.69			363,600	2.67		0.68
363,950	2.69	0.69			363,950	2.67		0.68
364,300	2.69	0.69			364,300	2.67		0.69
364,650	2.69	0.70			364,650	2.68		0.69
365,000	2.70	0.70			365,000	2.68		0.69
365,350	2.70	0.70			365,350	2.68		0.70
365,700	2.70	0.71			365,700	2.69		0.70
366,050	2.71	0.71			366,050	2.69		0.70
366,400	2.71	0.71			366,400	2.69		0.70
366,750	2.71	0.71			366,750	2.69		0.71
367,100	2.71	0.72			367,100	2.70		0.71
367,450	2.72	0.72			367,450	2.70		0.71
367,800	2.72	0.72			367,800	2.70		0.72
368,150	2.72	0.73			368,150	2.70		0.72
368,500	2.73	0.73			368,500	2.71		0.72
368,850	2.73	0.73			368,850	2.71		0.72
369,200	2.73	0.73			369,200	2.71		0.73
369,550	2.73	0.74			369,550	2.72		0.73
369,900	2.74	0.74			369,900	2.72		0.73
370,250	2.74	0.74			370,250	2.72		0.74
370,600	2.74	0.75			370,600	2.72		0.74
370,950	2.75	0.75			370,950	2.73		0.74
371,300	2.75	0.75			371,300	2.73		0.74
371,650	2.75	0.75			371,650	2.73		0.75
372,000	2.75	0.76			372,000	2.74		0.75
372,350	2.76	0.76			372,350	2.74		0.75
372,700	2.76	0.76			372,700	2.74		0.76
373,050	2.76	0.77			373,050	2.74		0.76
373,400	2.77	0.77			373,400	2.75		0.76
373,750	2.77	0.77			373,750	2.75		0.76
374,100	2.77	0.77			374,100	2.75		0.77
374,450	2.77	0.78			374,450	2.76		0.77
374,800	2.78	0.78			374,800	2.76		0.77
375,150	2.78	0.78			375,150	2.76		0.78
375,500	2.78	0.79			375,500	2.76		0.78
375,850	2.79	0.79			375,850	2.77		0.78
376,200	2.79	0.79			376,200	2.77		0.79
376,550	2.79	0.80			376,550	2.77		0.79
376,900	2.80	0.80			376,900	2.78		0.79
377,250	2.80	0.80			377,250	2.78		0.80
377,600	2.80	0.81			377,600	2.79		0.80
377,950	2.81	0.81			377,950	2.79		0.80
378,300	2.81	0.81			378,300	2.79		0.81
378,650	2.81	0.82			378,650	2.80		0.81
379,000	2.82	0.82			379,000	2.80		0.81
379,350	2.82	0.82			379,350	2.80		0.82
379,700	2.82	0.83			379,700	2.81		0.82
380,050	2.83	0.83			380,050	2.81		0.82
380,400	2.83	0.83			380,400	2.81		0.83
380,750	2.83	0.84			380,750	2.82		0.83

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
381,100	2.84	0.84			***381,100***	2.82		0.83
381,450	2.84	0.85			***381,450***	2.82		0.84
381,800	2.84	0.85			***381,800***	2.82		0.84
382,150	2.85	0.85			***382,150***	2.83		0.84
382,500	2.85	0.85			***382,500***	2.83		0.85
382,850	2.85	0.86			***382,850***	2.83		0.85
383,200	2.85	0.86			***383,200***	2.84		0.85
383,550	2.86	0.86			***383,550***	2.84		0.85
383,900	2.86	0.87			***383,900***	2.84		0.86
384,250	2.86	0.87			***384,250***	2.84		0.86
384,600	2.87	0.87			***384,600***	2.85		0.86
384,950	2.87	0.87			***384,950***	2.85		0.87
385,300	2.87	0.88			***385,300***	2.85		0.87
385,650	2.87	0.88			***385,650***	2.86		0.87
386,000	2.88	0.88			***386,000***	2.86		0.87
386,350	2.88	0.89			***386,350***	2.86		0.88
386,700	2.88	0.89			***386,700***	2.86		0.88
387,050	2.89	0.89			***387,050***	2.87		0.88
387,400	2.89	0.89			***387,400***	2.87		0.89
387,750	2.89	0.90			***387,750***	2.87		0.89
388,100	2.89	0.90			***388,100***	2.88		0.89
388,450	2.90	0.90			***388,450***	2.88		0.90
388,800	2.90	0.91			***388,800***	2.88		0.90
389,150	2.90	0.91			***389,150***	2.89		0.90
389,500	2.91	0.91			***389,500***	2.89		0.91
389,850	2.91	0.92			***389,850***	2.89		0.91
390,200	2.92	0.92			***390,200***	2.90		0.91
390,550	2.92	0.92			***390,550***	2.90		0.92
390,900	2.92	0.93			***390,900***	2.90		0.92
391,250	2.93	0.93			***391,250***	2.91		0.92
391,600	2.93	0.93			***391,600***	2.91		0.93
391,950	2.93	0.94			***391,950***	2.91		0.93
392,300	2.94	0.94			***392,300***	2.92		0.93
392,650	2.94	0.94			***392,650***	2.92		0.94
393,000	2.94	0.95			***393,000***	2.92		0.94
393,350	2.95	0.95			***393,350***	2.93		0.94
393,700	2.95	0.96			***393,700***	2.93		0.95
394,050	2.95	0.96			***394,050***	2.93		0.95
394,400	2.95	0.96			***394,400***	2.94		0.95
394,750	2.96	0.96			***394,750***	2.94		0.96
395,100	2.96	0.97			***395,100***	2.94		0.96
395,450	2.96	0.97			***395,450***	2.94		0.96
395,800	2.97	0.97			***395,800***	2.95		0.97
396,150	2.97	0.98			***396,150***	2.95		0.97
396,500	2.97	0.98			***396,500***	2.95		0.97
396,850	2.97	0.98			***396,850***	2.96		0.97
397,200	2.98	0.98			***397,200***	2.96		0.98
397,550	2.98	0.99			***397,550***	2.96		0.98
397,900	2.98	0.99			***397,900***	2.96		0.98
398,250	2.99	0.99			***398,250***	2.97		0.99
398,600	2.99	1.00			***398,600***	2.97		0.99

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
398,950	2.99	1.00			***398,950***	2.97		0.99
399,300	2.99	1.00			***399,300***	2.98		0.99
399,650	3.00	1.00			***399,650***	2.98		1.00
400,000	3.00	1.01			***400,000***	2.98		1.00
400,350	3.00	1.01			***400,350***	2.98		1.00
400,700	3.01	1.01			***400,700***	2.99		1.01
401,050	3.01	1.02			***401,050***	2.99		1.01
401,400	3.01	1.02			***401,400***	2.99		1.01
401,750	3.02	1.02			***401,750***	3.00		1.02
402,100	3.02	1.03			***402,100***	3.00		1.02
402,450	3.02	1.03			***402,450***	3.00		1.02
402,800	3.03	1.03			***402,800***	3.01		1.03
403,150	3.03	1.04			***403,150***	3.01		1.03
403,500	3.03	1.04			***403,500***	3.01		1.03
403,850	3.04	1.04			***403,850***	3.02		1.04
404,200	3.04	1.05			***404,200***	3.02		1.04
404,550	3.04	1.05			***404,550***	3.02		1.04
404,900	3.05	1.05			***404,900***	3.03		1.05
405,250	3.05	1.06			***405,250***	3.03		1.05
405,600	3.05	1.06			***405,600***	3.04		1.05
405,950	3.06	1.06			***405,950***	3.04		1.06
406,300	3.06	1.07			***406,300***	3.04		1.06
406,650	3.06	1.07			***406,650***	3.05		1.06
407,000	3.07	1.07			***407,000***	3.05		1.07
407,350	3.07	1.08			***407,350***	3.05		1.07
407,700	3.07	1.08			***407,700***	3.05		1.07
408,050	3.07	1.08			***408,050***	3.06		1.08
408,400	3.08	1.09			***408,400***	3.06		1.08
408,750	3.08	1.09			***408,750***	3.06		1.08
409,100	3.08	1.09			***409,100***	3.06		1.08
409,450	3.09	1.09			***409,450***	3.07		1.09
409,800	3.09	1.10			***409,800***	3.07		1.09
410,150	3.09	1.10			***410,150***	3.07		1.09
410,500	3.09	1.10			***410,500***	3.08		1.10
410,850	3.10	1.11			***410,850***	3.08		1.10
411,200	3.10	1.11			***411,200***	3.08		1.10
411,550	3.10	1.11			***411,550***	3.08		1.10
411,900	3.11	1.11			***411,900***	3.09		1.11
412,250	3.11	1.12			***412,250***	3.09		1.11
412,600	3.11	1.12			***412,600***	3.09		1.11
412,950	3.11	1.12			***412,950***	3.10		1.12
413,300	3.12	1.13			***413,300***	3.10		1.12
413,650	3.12	1.13			***413,650***	3.10		1.12
414,000	3.12	1.13			***414,000***	3.11		1.13
414,350	3.13	1.14			***414,350***	3.11		1.13
414,700	3.13	1.14			***414,700***	3.11		1.13
415,050	3.13	1.14			***415,050***	3.12		1.14
415,400	3.14	1.15			***415,400***	3.12		1.14
415,750	3.14	1.15			***415,750***	3.12		1.14
416,100	3.14	1.15			***416,100***	3.13		1.15
416,450	3.15	1.16			***416,450***	3.13		1.15

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
416,800	3.15	1.16			416,800	3.13		1.15
417,150	3.15	1.16			417,150	3.14		1.16
417,500	3.16	1.17			417,500	3.14		1.16
417,850	3.16	1.17			417,850	3.14		1.16
418,200	3.16	1.17			418,200	3.15		1.17
418,550	3.17	1.18			418,550	3.15		1.17
418,900	3.17	1.18			418,900	3.15		1.17
419,250	3.17	1.18			419,250	3.16		1.18
419,600	3.18	1.19			419,600	3.16		1.18
419,950	3.18	1.19			419,950	3.16		1.18
420,300	3.18	1.19			420,300	3.16		1.19
420,650	3.19	1.20			420,650	3.17		1.19
421,000	3.19	1.20			421,000	3.17		1.19
421,350	3.19	1.20			421,350	3.17		1.19
421,700	3.19	1.20			421,700	3.18		1.20
422,050	3.20	1.21			422,050	3.18		1.20
422,400	3.20	1.21			422,400	3.18		1.20
422,750	3.20	1.21			422,750	3.18		1.21
423,100	3.21	1.22			423,100	3.19		1.21
423,450	3.21	1.22			423,450	3.19		1.21
423,800	3.21	1.22			423,800	3.19		1.21
424,150	3.21	1.22			424,150	3.20		1.22
424,500	3.22	1.23			424,500	3.20		1.22
424,850	3.22	1.23			424,850	3.20		1.22
425,200	3.22	1.23			425,200	3.20		1.23
425,550	3.23	1.24			425,550	3.21		1.23
425,900	3.23	1.24			425,900	3.21		1.23
426,250	3.23	1.24			426,250	3.21		1.24
426,600	3.24	1.25			426,600	3.22		1.24
426,950	3.24	1.25			426,950	3.22		1.24
427,300	3.24	1.25			427,300	3.22		1.25
427,650	3.25	1.26			427,650	3.23		1.25
428,000	3.25	1.26			428,000	3.23		1.25
428,350	3.25	1.26			428,350	3.23		1.26
428,700	3.26	1.27			428,700	3.24		1.26
429,050	3.26	1.27			429,050	3.24		1.26
429,400	3.26	1.27			429,400	3.24		1.27
429,750	3.27	1.28			429,750	3.25		1.27
430,100	3.27	1.28			430,100	3.25		1.27
430,450	3.27	1.28			430,450	3.25		1.28
430,800	3.28	1.29			430,800	3.26		1.28
431,150	3.28	1.29			431,150	3.26		1.28
431,500	3.28	1.29			431,500	3.26		1.29
431,850	3.29	1.30			431,850	3.27		1.29
432,200	3.29	1.30			432,200	3.27		1.29
432,550	3.29	1.30			432,550	3.27		1.30
432,900	3.29	1.31			432,900	3.28		1.30
433,250	3.30	1.31			433,250	3.28		1.30
433,600	3.30	1.31			433,600	3.28		1.30
433,950	3.30	1.31			433,950	3.28		1.31
434,300	3.31	1.32			434,300	3.29		1.31

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
434,650	3.31	1.32			434,650	3.29		1.31
435,000	3.31	1.32			435,000	3.29		1.32
435,350	3.31	1.33			435,350	3.30		1.32
435,700	3.32	1.33			435,700	3.30		1.32
436,050	3.32	1.33			436,050	3.30		1.32
436,400	3.32	1.33			436,400	3.30		1.33
436,750	3.33	1.34			436,750	3.31		1.33
437,100	3.33	1.34			437,100	3.31		1.33
437,450	3.33	1.34			437,450	3.31		1.34
437,800	3.33	1.35			437,800	3.32		1.34
438,150	3.34	1.35			438,150	3.32		1.34
438,500	3.34	1.35			438,500	3.32		1.34
438,850	3.34	1.35			438,850	3.32		1.35
439,200	3.34	1.36			439,200	3.32		1.35
439,550	3.35	1.36			439,550	3.33		1.35
439,900	3.35	1.36			439,900	3.33		1.35
440,250	3.35	1.36			440,250	3.33		1.35
440,600	3.35	1.36			440,600	3.33		1.36
440,950	3.35	1.37			440,950	3.34		1.36
441,300	3.36	1.37			441,300	3.34		1.36
441,650	3.36	1.37			441,650	3.34		1.36
442,000	3.36	1.37			442,000	3.34		1.37
442,350	3.36	1.38			442,350	3.34		1.37
442,700	3.37	1.38			442,700	3.35		1.37
443,050	3.37	1.38			443,050	3.35		1.37
443,400	3.37	1.38			443,400	3.35		1.38
443,750	3.37	1.39			443,750	3.35		1.38
444,100	3.37	1.39			444,100	3.36		1.38
444,450	3.38	1.39			444,450	3.36		1.38
444,800	3.38	1.39			444,800	3.36		1.38
445,150	3.38	1.40			445,150	3.36		1.39
445,500	3.39	1.40			445,500	3.37		1.39
445,850	3.39	1.40			445,850	3.37		1.39
446,200	3.39	1.40			446,200	3.37		1.40
446,550	3.39	1.41			446,550	3.38		1.40
446,900	3.40	1.41			446,900	3.38		1.40
447,250	3.40	1.41			447,250	3.38		1.40
447,600	3.40	1.42			447,600	3.38		1.41
447,950	3.40	1.42			447,950	3.39		1.41
448,300	3.41	1.42			448,300	3.39		1.41
448,650	3.41	1.42			448,650	3.39		1.42
449,000	3.41	1.43			449,000	3.39		1.42
449,350	3.42	1.43			449,350	3.40		1.42
449,700	3.42	1.43			449,700	3.40		1.42
450,050	3.42	1.44			450,050	3.40		1.43
450,400	3.42	1.44			450,400	3.41		1.43
450,750	3.43	1.44			450,750	3.41		1.43
451,100	3.43	1.44			451,100	3.41		1.43
451,450	3.43	1.44			451,450	3.41		1.44
451,800	3.43	1.45			451,800	3.41		1.44
452,150	3.43	1.45			452,150	3.42		1.44

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
452,500	3.44	1.45			452,500	3.42		1.44
452,850	3.44	1.45			452,850	3.42		1.44
453,200	3.44	1.45			453,200	3.42		1.45
453,550	3.44	1.45			453,550	3.42		1.45
453,900	3.44	1.46			453,900	3.42		1.45
454,250	3.44	1.46			454,250	3.43		1.45
454,600	3.45	1.46			454,600	3.43		1.45
454,950	3.45	1.46			454,950	3.43		1.45
455,300	3.45	1.46			455,300	3.43		1.46
455,650	3.45	1.46			455,650	3.43		1.46
456,000	3.45	1.47			456,000	3.43		1.46
456,350	3.45	1.47			456,350	3.44		1.46
456,700	3.46	1.47			456,700	3.44		1.46
457,050	3.46	1.47			457,050	3.44		1.46
457,400	3.46	1.47			457,400	3.44		1.47
457,750	3.46	1.48			457,750	3.44		1.47
458,100	3.46	1.48			458,100	3.45		1.47
458,450	3.47	1.48			458,450	3.45		1.47
458,800	3.47	1.48			458,800	3.45		1.48
459,150	3.47	1.49			459,150	3.45		1.48
459,500	3.47	1.49			459,500	3.45		1.48
459,850	3.48	1.49			459,850	3.46		1.48
460,200	3.48	1.49			460,200	3.46		1.48
460,550	3.48	1.49			460,550	3.46		1.49
460,900	3.48	1.50			460,900	3.46		1.49
461,250	3.48	1.50			461,250	3.47		1.49
461,600	3.49	1.50			461,600	3.47		1.49
461,950	3.49	1.50			461,950	3.47		1.50
462,300	3.49	1.50			462,300	3.47		1.50
462,650	3.49	1.51			462,650	3.47		1.50
463,000	3.49	1.51			463,000	3.47		1.50
463,350	3.49	1.51			463,350	3.48		1.50
463,700	3.50	1.51			463,700	3.48		1.50
464,050	3.50	1.51			464,050	3.48		1.50
464,400	3.50	1.51			464,400	3.48		1.51
464,750	3.50	1.51			464,750	3.48		1.51
465,100	3.50	1.52			465,100	3.48		1.51
465,450	3.50	1.52			465,450	3.48		1.51
465,800	3.50	1.52			465,800	3.48		1.51
466,150	3.50	1.52			466,150	3.49		1.51
466,500	3.51	1.52			466,500	3.49		1.51
466,850	3.51	1.52			466,850	3.49		1.51
467,200	3.51	1.52			467,200	3.49		1.52
467,550	3.51	1.52			467,550	3.49		1.52
467,900	3.51	1.53			467,900	3.49		1.52
468,250	3.51	1.53			468,250	3.49		1.52
468,600	3.51	1.53			468,600	3.49		1.52
468,950	3.51	1.53			468,950	3.50		1.52
469,300	3.51	1.53			469,300	3.50		1.52
469,650	3.52	1.53			469,650	3.50		1.52
470,000	3.52	1.53			470,000	3.50		1.53

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
470,350	3.52	1.53			470,350	3.50		1.53
470,700	3.52	1.54			470,700	3.50		1.53
471,050	3.52	1.54			471,050	3.50		1.53
471,400	3.52	1.54			471,400	3.50		1.53
471,750	3.52	1.54			471,750	3.50		1.53
472,100	3.52	1.54			472,100	3.51		1.53
472,450	3.53	1.54			472,450	3.51		1.53
472,800	3.53	1.54			472,800	3.51		1.54
473,150	3.53	1.54			473,150	3.51		1.54
473,500	3.53	1.55			473,500	3.51		1.54
473,850	3.53	1.55			473,850	3.51		1.54
474,200	3.53	1.55			474,200	3.51		1.54
474,550	3.53	1.55			474,550	3.51		1.54
474,900	3.53	1.55			474,900	3.52		1.54
475,250	3.54	1.55			475,250	3.52		1.54
475,600	3.54	1.55			475,600	3.52		1.55
475,950	3.54	1.55			475,950	3.52		1.55
476,300	3.54	1.56			476,300	3.52		1.55
476,650	3.54	1.56			476,650	3.52		1.55
477,000	3.54	1.56			477,000	3.52		1.55
477,350	3.54	1.56			477,350	3.52		1.55
477,700	3.54	1.56			477,700	3.53		1.55
478,050	3.54	1.56			478,050	3.53		1.55
478,400	3.55	1.56			478,400	3.53		1.56
478,750	3.55	1.56			478,750	3.53		1.56
479,100	3.55	1.57			479,100	3.53		1.56
479,450	3.55	1.57			479,450	3.53		1.56
479,800	3.55	1.57			479,800	3.53		1.56
480,150	3.55	1.57			480,150	3.53		1.56
480,500	3.55	1.57			480,500	3.53		1.56
480,850	3.55	1.57			480,850	3.54		1.56
481,200	3.56	1.57			481,200	3.54		1.56
481,550	3.56	1.57			481,550	3.54		1.57
481,900	3.56	1.58			481,900	3.54		1.57
482,250	3.56	1.58			482,250	3.54		1.57
482,600	3.56	1.58			482,600	3.54		1.57
482,950	3.56	1.58			482,950	3.54		1.57
483,300	3.56	1.58			483,300	3.54		1.57
483,650	3.56	1.58			483,650	3.55		1.57
484,000	3.56	1.58			484,000	3.55		1.57
484,350	3.57	1.58			484,350	3.55		1.58
484,700	3.57	1.58			484,700	3.55		1.58
485,050	3.57	1.59			485,050	3.55		1.58
485,400	3.57	1.59			485,400	3.55		1.58
485,750	3.57	1.59			485,750	3.55		1.58
486,100	3.57	1.59			486,100	3.55		1.58
486,450	3.57	1.59			486,450	3.55		1.58
486,800	3.57	1.59			486,800	3.56		1.58
487,150	3.58	1.59			487,150	3.56		1.59
487,500	3.58	1.59			487,500	3.56		1.59
487,850	3.58	1.60			487,850	3.56		1.59

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
488,200	3.58	1.60			488,200	3.56		1.59
488,550	3.58	1.60			488,550	3.56		1.59
488,900	3.58	1.60			488,900	3.56		1.59
489,250	3.58	1.60			489,250	3.56		1.59
489,600	3.58	1.60			489,600	3.57		1.59
489,950	3.59	1.60			489,950	3.57		1.60
490,300	3.59	1.60			490,300	3.57		1.60
490,650	3.59	1.61			490,650	3.57		1.60
491,000	3.59	1.61			491,000	3.57		1.60
491,350	3.59	1.61			491,350	3.57		1.60
491,700	3.59	1.61			491,700	3.57		1.60
492,050	3.59	1.61			492,050	3.57		1.60
492,400	3.59	1.61			492,400	3.58		1.60
492,750	3.59	1.61			492,750	3.58		1.61
493,100	3.60	1.61			493,100	3.58		1.61
493,450	3.60	1.62			493,450	3.58		1.61
493,800	3.60	1.62			493,800	3.58		1.61
494,150	3.60	1.62			494,150	3.58		1.61
494,500	3.60	1.62			494,500	3.58		1.61
494,850	3.60	1.62			494,850	3.58		1.61
495,200	3.60	1.62			495,200	3.58		1.61
495,550	3.60	1.62			495,550	3.58		1.61
495,900	3.60	1.62			495,900	3.59		1.62
496,250	3.61	1.62			496,250	3.59		1.62
496,600	3.61	1.62			496,600	3.59		1.62
496,950	3.61	1.63			496,950	3.59		1.62
497,300	3.61	1.63			497,300	3.59		1.62
497,650	3.61	1.63			497,650	3.59		1.62
498,000	3.61	1.63			498,000	3.59		1.62
498,350	3.61	1.63			498,350	3.59		1.62
498,700	3.61	1.63			498,700	3.59		1.62
499,050	3.61	1.63			499,050	3.59		1.62
499,400	3.61	1.63			499,400	3.59		1.62
499,750	3.61	1.63			499,750	3.59		1.62
500,100	3.61	1.63			500,100	3.60		1.63
500,450	3.61	1.63			500,450	3.60		1.63
500,800	3.62	1.63			500,800	3.60		1.63
501,150	3.62	1.64			501,150	3.60		1.63
501,500	3.62	1.64			501,500	3.60		1.63
501,850	3.62	1.64			501,850	3.60		1.63
502,200	3.62	1.64			502,200	3.60		1.63
502,550	3.62	1.64			502,550	3.60		1.63
502,900	3.62	1.64			502,900	3.60		1.63
503,250	3.62	1.64			503,250	3.60		1.64
503,600	3.62	1.64			503,600	3.61		1.64
503,950	3.63	1.65			503,950	3.61		1.64
504,300	3.63	1.65			504,300	3.61		1.64
504,650	3.63	1.65			504,650	3.61		1.64
505,000	3.63	1.65			505,000	3.61		1.64
505,350	3.63	1.65			505,350	3.61		1.64
505,700	3.63	1.65			505,700	3.61		1.64

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
506,050	3.63	1.65			506,050	3.61		1.64
506,400	3.63	1.65			506,400	3.62		1.65
506,750	3.64	1.65			506,750	3.62		1.65
507,100	3.64	1.66			507,100	3.62		1.65
507,450	3.64	1.66			507,450	3.62		1.65
507,800	3.64	1.66			507,800	3.62		1.65
508,150	3.64	1.66			508,150	3.62		1.65
508,500	3.64	1.66			508,500	3.62		1.65
508,850	3.64	1.66			508,850	3.62		1.65
509,200	3.64	1.66			509,200	3.62		1.66
509,550	3.64	1.66			509,550	3.63		1.66
509,900	3.65	1.67			509,900	3.63		1.66
510,250	3.65	1.67			510,250	3.63		1.66
510,600	3.65	1.67			510,600	3.63		1.66
510,950	3.65	1.67			510,950	3.63		1.66
511,300	3.65	1.67			511,300	3.63		1.66
511,650	3.65	1.67			511,650	3.63		1.66
512,000	3.65	1.67			512,000	3.63		1.67
512,350	3.65	1.67			512,350	3.64		1.67
512,700	3.66	1.68			512,700	3.64		1.67
513,050	3.66	1.68			513,050	3.64		1.67
513,400	3.66	1.68			513,400	3.64		1.67
513,750	3.66	1.68			513,750	3.64		1.67
514,100	3.66	1.68			514,100	3.64		1.67
514,450	3.66	1.68			514,450	3.64		1.67
514,800	3.66	1.68			514,800	3.64		1.67
515,150	3.66	1.68			515,150	3.64		1.68
515,500	3.66	1.68			515,500	3.64		1.68
515,850	3.66	1.68			515,850	3.65		1.68
516,200	3.66	1.69			516,200	3.65		1.68
516,550	3.67	1.69			516,550	3.65		1.68
516,900	3.67	1.69			516,900	3.65		1.68
517,250	3.67	1.69			517,250	3.65		1.68
517,600	3.67	1.69			517,600	3.65		1.68
517,950	3.67	1.69			517,950	3.65		1.68
518,300	3.67	1.69			518,300	3.65		1.68
518,650	3.67	1.69			518,650	3.65		1.68
519,000	3.67	1.69			519,000	3.65		1.68
519,350	3.67	1.69			519,350	3.65		1.68
519,700	3.67	1.69			519,700	3.65		1.69
520,050	3.67	1.69			520,050	3.65		1.69
520,400	3.67	1.70			520,400	3.66		1.69
520,750	3.67	1.70			520,750	3.66		1.69
521,100	3.68	1.70			521,100	3.66		1.69
521,450	3.68	1.70			521,450	3.66		1.69
521,800	3.68	1.70			521,800	3.66		1.69
522,150	3.68	1.70			522,150	3.66		1.69
522,500	3.68	1.70			522,500	3.66		1.69
522,850	3.68	1.70			522,850	3.66		1.69
523,200	3.68	1.70			523,200	3.66		1.69
523,550	3.68	1.70			523,550	3.66		1.69

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
523,900	3.68	1.70			523,900	3.66		1.70
524,250	3.68	1.70			524,250	3.66		1.70
524,600	3.68	1.70			524,600	3.66		1.70
524,950	3.68	1.71			524,950	3.67		1.70
525,300	3.68	1.71			525,300	3.67		1.70
525,650	3.69	1.71			525,650	3.67		1.70
526,000	3.69	1.71			526,000	3.67		1.70
526,350	3.69	1.71			526,350	3.67		1.70
526,700	3.69	1.71			526,700	3.67		1.70
527,050	3.69	1.71			527,050	3.67		1.70
527,400	3.69	1.71			527,400	3.67		1.70
527,750	3.69	1.71			527,750	3.67		1.70
528,100	3.69	1.71			528,100	3.67		1.70
528,450	3.69	1.71			528,450	3.67		1.70
528,800	3.69	1.71			528,800	3.67		1.70
529,150	3.69	1.71			529,150	3.67		1.70
529,500	3.69	1.71			529,500	3.67		1.71
529,850	3.69	1.71			529,850	3.67		1.71
530,200	3.69	1.71			530,200	3.67		1.71
530,550	3.69	1.71			530,550	3.67		1.71
530,900	3.69	1.71			530,900	3.67		1.71
531,250	3.69	1.71			531,250	3.67		1.71
531,600	3.69	1.72			531,600	3.67		1.71
531,950	3.69	1.72			531,950	3.68		1.71
532,300	3.69	1.72			532,300	3.68		1.71
532,650	3.69	1.72			532,650	3.68		1.71
533,000	3.70	1.72			533,000	3.68		1.71
533,350	3.70	1.72			533,350	3.68		1.71
533,700	3.70	1.72			533,700	3.68		1.71
534,050	3.70	1.72			534,050	3.68		1.71
534,400	3.70	1.72			534,400	3.68		1.71
534,750	3.70	1.72			534,750	3.68		1.71
535,100	3.70	1.72			535,100	3.68		1.71
535,450	3.70	1.72			535,450	3.68		1.72
535,800	3.70	1.72			535,800	3.68		1.72
536,150	3.70	1.72			536,150	3.68		1.72
536,500	3.70	1.73			536,500	3.68		1.72
536,850	3.70	1.73			536,850	3.69		1.72
537,200	3.70	1.73			537,200	3.69		1.72
537,550	3.71	1.73			537,550	3.69		1.72
537,900	3.71	1.73			537,900	3.69		1.72
538,250	3.71	1.73			538,250	3.69		1.72
538,600	3.71	1.73			538,600	3.69		1.72
538,950	3.71	1.73			538,950	3.69		1.72
539,300	3.71	1.73			539,300	3.69		1.72
539,650	3.71	1.73			539,650	3.69		1.73
540,000	3.71	1.73			540,000	3.69		1.73
540,350	3.71	1.74			540,350	3.69		1.73
540,700	3.71	1.74			540,700	3.70		1.73
541,050	3.72	1.74			541,050	3.70		1.73
541,400	3.72	1.74			541,400	3.70		1.73

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
541,750	3.72	1.74			541,750	3.70		1.73
542,100	3.72	1.74			542,100	3.70		1.73
542,450	3.72	1.74			542,450	3.70		1.74
542,800	3.72	1.74			542,800	3.70		1.74
543,150	3.72	1.75			543,150	3.70		1.74
543,500	3.72	1.75			543,500	3.71		1.74
543,850	3.73	1.75			543,850	3.71		1.74
544,200	3.73	1.75			544,200	3.71		1.74
544,550	3.73	1.75			544,550	3.71		1.74
544,900	3.73	1.75			544,900	3.71		1.74
545,250	3.73	1.75			545,250	3.71		1.75
545,600	3.73	1.75			545,600	3.71		1.75
545,950	3.73	1.75			545,950	3.71		1.75
546,300	3.73	1.76			546,300	3.71		1.75
546,650	3.73	1.76			546,650	3.71		1.75
547,000	3.73	1.76			547,000	3.72		1.75
547,350	3.73	1.76			547,350	3.72		1.75
547,700	3.74	1.76			547,700	3.72		1.75
548,050	3.74	1.76			548,050	3.72		1.75
548,400	3.74	1.76			548,400	3.72		1.75
548,750	3.74	1.76			548,750	3.72		1.75
549,100	3.74	1.76			549,100	3.72		1.75
549,450	3.74	1.76			549,450	3.72		1.76
549,800	3.74	1.76			549,800	3.72		1.76
550,150	3.74	1.76			550,150	3.72		1.76
550,500	3.74	1.77			550,500	3.72		1.76
550,850	3.74	1.77			550,850	3.72		1.76
551,200	3.74	1.77			551,200	3.72		1.76
551,550	3.74	1.77			551,550	3.73		1.76
551,900	3.74	1.77			551,900	3.73		1.76
552,250	3.75	1.77			552,250	3.73		1.76
552,600	3.75	1.77			552,600	3.73		1.76
552,950	3.75	1.77			552,950	3.73		1.76
553,300	3.75	1.77			553,300	3.73		1.76
553,650	3.75	1.77			553,650	3.73		1.76
554,000	3.75	1.77			554,000	3.73		1.77
554,350	3.75	1.77			554,350	3.73		1.77
554,700	3.75	1.78			554,700	3.73		1.77
555,050	3.75	1.78			555,050	3.73		1.77
555,400	3.75	1.78			555,400	3.73		1.77
555,750	3.75	1.78			555,750	3.74		1.77
556,100	3.75	1.78			556,100	3.74		1.77
556,450	3.76	1.78			556,450	3.74		1.77
556,800	3.76	1.78			556,800	3.74		1.77
557,150	3.76	1.78			557,150	3.74		1.77
557,500	3.76	1.78			557,500	3.74		1.77
557,850	3.76	1.78			557,850	3.74		1.77
558,200	3.76	1.78			558,200	3.74		1.78
558,550	3.76	1.78			558,550	3.74		1.78
558,900	3.76	1.78			558,900	3.74		1.78
559,250	3.76	1.79			559,250	3.74		1.78

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
559,600	3.76	1.79			559,600	3.74		1.78
559,950	3.76	1.79			559,950	3.74		1.78
560,300	3.76	1.79			560,300	3.75		1.78
560,650	3.76	1.79			560,650	3.75		1.78
561,000	3.77	1.79			561,000	3.75		1.78
561,350	3.77	1.79			561,350	3.75		1.78
561,700	3.77	1.79			561,700	3.75		1.78
562,050	3.77	1.79			562,050	3.75		1.78
562,400	3.77	1.79			562,400	3.75		1.79
562,750	3.77	1.79			562,750	3.75		1.79
563,100	3.77	1.79			563,100	3.75		1.79
563,450	3.77	1.80			563,450	3.75		1.79
563,800	3.77	1.80			563,800	3.75		1.79
564,150	3.77	1.80			564,150	3.75		1.79
564,500	3.77	1.80			564,500	3.75		1.79
564,850	3.77	1.80			564,850	3.76		1.79
565,200	3.77	1.80			565,200	3.76		1.79
565,550	3.78	1.80			565,550	3.76		1.79
565,900	3.78	1.80			565,900	3.76		1.79
566,250	3.78	1.80			566,250	3.76		1.79
566,600	3.78	1.80			566,600	3.76		1.80
566,950	3.78	1.80			566,950	3.76		1.80
567,300	3.78	1.80			567,300	3.76		1.80
567,650	3.78	1.81			567,650	3.76		1.80
568,000	3.78	1.81			568,000	3.76		1.80
568,350	3.78	1.81			568,350	3.76		1.80
568,700	3.78	1.81			568,700	3.76		1.80
569,050	3.78	1.81			569,050	3.77		1.80
569,400	3.78	1.81			569,400	3.77		1.80
569,750	3.79	1.81			569,750	3.77		1.80
570,100	3.79	1.81			570,100	3.77		1.80
570,450	3.79	1.81			570,450	3.77		1.80
570,800	3.79	1.81			570,800	3.77		1.80
571,150	3.79	1.81			571,150	3.77		1.81
571,500	3.79	1.81			571,500	3.77		1.81
571,850	3.79	1.82			571,850	3.77		1.81
572,200	3.79	1.82			572,200	3.77		1.81
572,550	3.79	1.82			572,550	3.77		1.81
572,900	3.79	1.82			572,900	3.77		1.81
573,250	3.79	1.82			573,250	3.77		1.81
573,600	3.79	1.82			573,600	3.78		1.81
573,950	3.79	1.82			573,950	3.78		1.81
574,300	3.80	1.82			574,300	3.78		1.81
574,650	3.80	1.82			574,650	3.78		1.81
575,000	3.80	1.82			575,000	3.78		1.81
575,350	3.80	1.82			575,350	3.78		1.82
575,700	3.80	1.82			575,700	3.78		1.82
576,050	3.80	1.82			576,050	3.78		1.82
576,400	3.80	1.83			576,400	3.78		1.82
576,750	3.80	1.83			576,750	3.78		1.82
577,100	3.80	1.83			577,100	3.78		1.82

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
577,450	3.80	1.83			577,450	3.78		1.82
577,800	3.80	1.83			577,800	3.78		1.82
578,150	3.80	1.83			578,150	3.79		1.82
578,500	3.80	1.83			578,500	3.79		1.82
578,850	3.81	1.83			578,850	3.79		1.82
579,200	3.81	1.83			579,200	3.79		1.82
579,550	3.81	1.83			579,550	3.79		1.83
579,900	3.81	1.83			579,900	3.79		1.83
580,250	3.81	1.83			580,250	3.79		1.83
580,600	3.81	1.84			580,600	3.79		1.83
580,950	3.81	1.84			580,950	3.79		1.83
581,300	3.81	1.84			581,300	3.79		1.83
581,650	3.81	1.84			581,650	3.79		1.83
582,000	3.81	1.84			582,000	3.79		1.83
582,350	3.81	1.84			582,350	3.79		1.83
582,700	3.81	1.84			582,700	3.80		1.83
583,050	3.81	1.84			583,050	3.80		1.83
583,400	3.82	1.84			583,400	3.80		1.83
583,750	3.82	1.84			583,750	3.80		1.84
584,100	3.82	1.84			584,100	3.80		1.84
584,450	3.82	1.84			584,450	3.80		1.84
584,800	3.82	1.85			584,800	3.80		1.84
585,150	3.82	1.85			585,150	3.80		1.84
585,500	3.82	1.85			585,500	3.80		1.84
585,850	3.82	1.85			585,850	3.80		1.84
586,200	3.82	1.85			586,200	3.80		1.84
586,550	3.82	1.85			586,550	3.80		1.84
586,900	3.82	1.85			586,900	3.81		1.84
587,250	3.82	1.85			587,250	3.81		1.84
587,600	3.83	1.85			587,600	3.81		1.84
587,950	3.83	1.85			587,950	3.81		1.84
588,300	3.83	1.85			588,300	3.81		1.85
588,650	3.83	1.85			588,650	3.81		1.85
589,000	3.83	1.85			589,000	3.81		1.85
589,350	3.83	1.86			589,350	3.81		1.85
589,700	3.83	1.86			589,700	3.81		1.85
590,050	3.83	1.86			590,050	3.81		1.85
590,400	3.83	1.86			590,400	3.81		1.85
590,750	3.83	1.86			590,750	3.81		1.85
591,100	3.83	1.86			591,100	3.81		1.85
591,450	3.83	1.86			591,450	3.82		1.85
591,800	3.83	1.86			591,800	3.82		1.85
592,150	3.84	1.86			592,150	3.82		1.85
592,500	3.84	1.86			592,500	3.82		1.86
592,850	3.84	1.86			592,850	3.82		1.86
593,200	3.84	1.86			593,200	3.82		1.86
593,550	3.84	1.87			593,550	3.82		1.86
593,900	3.84	1.87			593,900	3.82		1.86
594,250	3.84	1.87			594,250	3.82		1.86
594,600	3.84	1.87			594,600	3.82		1.86
594,950	3.84	1.87			594,950	3.82		1.86

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
595,300	3.84	1.87			595,300	3.82		1.86
595,650	3.84	1.87			595,650	3.82		1.86
596,000	3.84	1.87			596,000	3.83		1.86
596,350	3.84	1.87			596,350	3.83		1.86
596,700	3.85	1.87			596,700	3.83		1.87
597,050	3.85	1.87			597,050	3.83		1.87
597,400	3.85	1.87			597,400	3.83		1.87
597,750	3.85	1.88			597,750	3.83		1.87
598,100	3.85	1.88			598,100	3.83		1.87
598,450	3.85	1.88			598,450	3.83		1.87
598,800	3.85	1.88			598,800	3.83		1.87
599,150	3.85	1.88			599,150	3.83		1.87
599,500	3.85	1.88			599,500	3.83		1.87
599,850	3.85	1.88			599,850	3.83		1.87
600,200	3.85	1.88			600,200	3.83		1.87
600,550	3.85	1.88			600,550	3.84		1.87
600,900	3.86	1.88			600,900	3.84		1.87
601,250	3.86	1.88			601,250	3.84		1.88
601,600	3.86	1.88			601,600	3.84		1.88
601,950	3.86	1.88			601,950	3.84		1.88
602,300	3.86	1.89			602,300	3.84		1.88
602,650	3.86	1.89			602,650	3.84		1.88
603,000	3.86	1.89			603,000	3.84		1.88
603,350	3.86	1.89			603,350	3.84		1.88
603,700	3.86	1.89			603,700	3.84		1.88
604,050	3.86	1.89			604,050	3.84		1.88
604,400	3.86	1.89			604,400	3.84		1.88
604,750	3.86	1.89			604,750	3.84		1.88
605,100	3.86	1.89			605,100	3.84		1.88
605,450	3.86	1.89			605,450	3.84		1.88
605,800	3.86	1.89			605,800	3.84		1.88
606,150	3.86	1.89			606,150	3.84		1.88
606,500	3.86	1.89			606,500	3.84		1.88
606,850	3.86	1.89			606,850	3.84		1.88
607,200	3.86	1.89			607,200	3.84		1.88
607,550	3.86	1.89			607,550	3.85		1.88
607,900	3.86	1.89			607,900	3.85		1.88
608,250	3.86	1.89			608,250	3.85		1.88
608,600	3.87	1.89			608,600	3.85		1.89
608,950	3.87	1.89			608,950	3.85		1.89
609,300	3.87	1.89			609,300	3.85		1.89
609,650	3.87	1.90			609,650	3.85		1.89
610,000	3.87	1.90			610,000	3.85		1.89
610,350	3.87	1.90			610,350	3.85		1.89
610,700	3.87	1.90			610,700	3.85		1.89
611,050	3.87	1.90			611,050	3.85		1.89
611,400	3.87	1.90			611,400	3.85		1.89
611,750	3.87	1.90			611,750	3.85		1.89
612,100	3.87	1.90			612,100	3.85		1.89
612,450	3.87	1.90			612,450	3.86		1.89
612,800	3.87	1.90			612,800	3.86		1.90

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
613,150	3.88	1.90			613,150	3.86		1.90
613,500	3.88	1.90			613,500	3.86		1.90
613,850	3.88	1.91			613,850	3.86		1.90
614,200	3.88	1.91			614,200	3.86		1.90
614,550	3.88	1.91			614,550	3.86		1.90
614,900	3.88	1.91			614,900	3.86		1.90
615,250	3.88	1.91			615,250	3.86		1.90
615,600	3.88	1.91			615,600	3.86		1.90
615,950	3.88	1.91			615,950	3.86		1.90
616,300	3.88	1.91			616,300	3.86		1.90
616,650	3.88	1.91			616,650	3.86		1.90
617,000	3.88	1.91			617,000	3.87		1.90
617,350	3.88	1.91			617,350	3.87		1.91
617,700	3.89	1.91			617,700	3.87		1.91
618,050	3.89	1.92			618,050	3.87		1.91
618,400	3.89	1.92			618,400	3.87		1.91
618,750	3.89	1.92			618,750	3.87		1.91
619,100	3.89	1.92			619,100	3.87		1.91
619,450	3.89	1.92			619,450	3.87		1.91
619,800	3.89	1.92			619,800	3.87		1.91
620,150	3.89	1.92			620,150	3.87		1.91
620,500	3.89	1.92			620,500	3.87		1.91
620,850	3.89	1.92			620,850	3.87		1.91
621,200	3.89	1.92			621,200	3.87		1.91
621,550	3.89	1.92			621,550	3.88		1.91
621,900	3.89	1.92			621,900	3.88		1.92
622,250	3.89	1.92			622,250	3.88		1.92
622,600	3.89	1.92			622,600	3.88		1.92
622,950	3.90	1.92			622,950	3.88		1.92
623,300	3.90	1.92			623,300	3.88		1.92
623,650	3.90	1.92			623,650	3.88		1.92
624,000	3.90	1.93			624,000	3.88		1.92
624,350	3.90	1.93			624,350	3.88		1.92
624,700	3.90	1.93			624,700	3.88		1.92
625,050	3.90	1.93			625,050	3.88		1.92
625,400	3.90	1.93			625,400	3.88		1.92
625,750	3.90	1.93			625,750	3.88		1.92
626,100	3.90	1.93			626,100	3.88		1.92
626,450	3.90	1.93			626,450	3.88		1.92
626,800	3.90	1.93			626,800	3.88		1.92
627,150	3.90	1.93			627,150	3.88		1.92
627,500	3.90	1.93			627,500	3.88		1.92
627,850	3.90	1.93			627,850	3.88		1.92
628,200	3.90	1.93			628,200	3.88		1.92
628,550	3.90	1.93			628,550	3.88		1.92
628,900	3.90	1.93			628,900	3.89		1.93
629,250	3.90	1.93			629,250	3.89		1.93
629,600	3.91	1.93			629,600	3.89		1.93
629,950	3.91	1.94			629,950	3.89		1.93
630,300	3.91	1.94			630,300	3.89		1.93
630,650	3.91	1.94			630,650	3.89		1.93

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
631,000	3.91	1.94			631,000	3.89		1.93
631,350	3.91	1.94			631,350	3.89		1.93
631,700	3.91	1.94			631,700	3.89		1.93
632,050	3.91	1.94			632,050	3.89		1.93
632,400	3.91	1.94			632,400	3.89		1.93
632,750	3.91	1.94			632,750	3.89		1.93
633,100	3.91	1.94			633,100	3.89		1.93
633,450	3.91	1.94			633,450	3.90		1.94
633,800	3.91	1.94			633,800	3.90		1.94
634,150	3.92	1.95			634,150	3.90		1.94
634,500	3.92	1.95			634,500	3.90		1.94
634,850	3.92	1.95			634,850	3.90		1.94
635,200	3.92	1.95			635,200	3.90		1.94
635,550	3.92	1.95			635,550	3.90		1.94
635,900	3.92	1.95			635,900	3.90		1.94
636,250	3.92	1.95			636,250	3.90		1.94
636,600	3.92	1.95			636,600	3.90		1.94
636,950	3.92	1.95			636,950	3.90		1.94
637,300	3.92	1.95			637,300	3.90		1.94
637,650	3.92	1.95			637,650	3.90		1.95
638,000	3.92	1.95			638,000	3.91		1.95
638,350	3.92	1.95			638,350	3.91		1.95
638,700	3.93	1.96			638,700	3.91		1.95
639,050	3.93	1.96			639,050	3.91		1.95
639,400	3.93	1.96			639,400	3.91		1.95
639,750	3.93	1.96			639,750	3.91		1.95
640,100	3.93	1.96			640,100	3.91		1.95
640,450	3.93	1.96			640,450	3.91		1.95
640,800	3.93	1.96			640,800	3.91		1.95
641,150	3.93	1.96			641,150	3.91		1.95
641,500	3.93	1.96			641,500	3.91		1.95
641,850	3.93	1.96			641,850	3.91		1.95
642,200	3.93	1.96			642,200	3.91		1.95
642,550	3.93	1.96			642,550	3.91		1.95
642,900	3.93	1.96			642,900	3.91		1.95
643,250	3.93	1.96			643,250	3.91		1.95
643,600	3.93	1.96			643,600	3.91		1.95
643,950	3.93	1.96			643,950	3.91		1.96
644,300	3.93	1.96			644,300	3.91		1.96
644,650	3.93	1.96			644,650	3.91		1.96
645,000	3.93	1.96			645,000	3.92		1.96
645,350	3.93	1.96			645,350	3.92		1.96
645,700	3.93	1.97			645,700	3.92		1.96
646,050	3.94	1.97			646,050	3.92		1.96
646,400	3.94	1.97			646,400	3.92		1.96
646,750	3.94	1.97			646,750	3.92		1.96
647,100	3.94	1.97			647,100	3.92		1.96
647,450	3.94	1.97			647,450	3.92		1.96
647,800	3.94	1.97			647,800	3.92		1.96
648,150	3.94	1.97			648,150	3.92		1.96
648,500	3.94	1.97			648,500	3.92		1.96

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
648,850	3.94	1.97			648,850	3.92		1.96
649,200	3.94	1.97			649,200	3.92		1.96
649,550	3.94	1.97			649,550	3.92		1.97
649,900	3.94	1.97			649,900	3.93		1.97
650,250	3.94	1.98			650,250	3.93		1.97
650,600	3.95	1.98			650,600	3.93		1.97
650,950	3.95	1.98			650,950	3.93		1.97
651,300	3.95	1.98			651,300	3.93		1.97
651,650	3.95	1.98			651,650	3.93		1.97
652,000	3.95	1.98			652,000	3.93		1.97
652,350	3.95	1.98			652,350	3.93		1.97
652,700	3.95	1.98			652,700	3.93		1.97
653,050	3.95	1.98			653,050	3.93		1.97
653,400	3.95	1.98			653,400	3.93		1.97
653,750	3.95	1.98			653,750	3.93		1.97
654,100	3.95	1.98			654,100	3.93		1.97
654,450	3.95	1.98			654,450	3.93		1.97
654,800	3.95	1.98			654,800	3.93		1.98
655,150	3.95	1.98			655,150	3.93		1.98
655,500	3.95	1.98			655,500	3.93		1.98
655,850	3.95	1.98			655,850	3.93		1.98
656,200	3.95	1.98			656,200	3.93		1.98
656,550	3.95	1.98			656,550	3.94		1.98
656,900	3.95	1.99			656,900	3.94		1.98
657,250	3.95	1.99			657,250	3.94		1.98
657,600	3.96	1.99			657,600	3.94		1.98
657,950	3.96	1.99			657,950	3.94		1.98
658,300	3.96	1.99			658,300	3.94		1.98
658,650	3.96	1.99			658,650	3.94		1.98
659,000	3.96	1.99			659,000	3.94		1.98
659,350	3.96	1.99			659,350	3.94		1.98
659,700	3.96	1.99			659,700	3.94		1.98
660,050	3.96	1.99			660,050	3.94		1.98
660,400	3.96	1.99			660,400	3.94		1.98
660,750	3.96	1.99			660,750	3.94		1.98
661,100	3.96	1.99			661,100	3.94		1.99
661,450	3.96	1.99			661,450	3.94		1.99
661,800	3.96	1.99			661,800	3.94		1.99
662,150	3.96	2.00			662,150	3.95		1.99
662,500	3.96	2.00			662,500	3.95		1.99
662,850	3.97	2.00			662,850	3.95		1.99
663,200	3.97	2.00			663,200	3.95		1.99
663,550	3.97	2.00			663,550	3.95		1.99
663,900	3.97	2.00			663,900	3.95		1.99
664,250	3.97	2.00			664,250	3.95		1.99
664,600	3.97	2.00			664,600	3.95		1.99
664,950	3.97	2.00			664,950	3.95		1.99
665,300	3.97	2.00			665,300	3.95		1.99
665,650	3.97	2.00			665,650	3.95		2.00
666,000	3.97	2.00			666,000	3.95		2.00
666,350	3.97	2.00			666,350	3.95		2.00

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
666,700	3.97	2.00			666,700	3.95		2.00
667,050	3.97	2.00			667,050	3.95		2.00
667,400	3.97	2.00			667,400	3.95		2.00
667,750	3.97	2.01			667,750	3.95		2.00
668,100	3.97	2.01			668,100	3.96		2.00
668,450	3.97	2.01			668,450	3.96		2.00
668,800	3.97	2.01			668,800	3.96		2.00
669,150	3.98	2.01			669,150	3.96		2.00
669,500	3.98	2.01			669,500	3.96		2.00
669,850	3.98	2.01			669,850	3.96		2.00
670,200	3.98	2.01			670,200	3.96		2.00
670,550	3.98	2.01			670,550	3.96		2.00
670,900	3.98	2.01			670,900	3.96		2.00
671,250	3.98	2.01			671,250	3.96		2.00
671,600	3.98	2.01			671,600	3.96		2.00
671,950	3.98	2.01			671,950	3.96		2.00
672,300	3.98	2.01			672,300	3.96		2.00
672,650	3.98	2.01			672,650	3.96		2.00
673,000	3.98	2.01			673,000	3.96		2.00
673,350	3.98	2.01			673,350	3.96		2.00
673,700	3.98	2.01			673,700	3.96		2.00
674,050	3.98	2.01			674,050	3.96		2.00
674,400	3.98	2.01			674,400	3.96		2.01
674,750	3.98	2.01			674,750	3.96		2.01
675,100	3.98	2.01			675,100	3.96		2.01
675,450	3.98	2.01			675,450	3.96		2.01
675,800	3.98	2.01			675,800	3.96		2.01
676,150	3.98	2.01			676,150	3.96		2.01
676,500	3.98	2.02			676,500	3.96		2.01
676,850	3.98	2.02			676,850	3.97		2.01
677,200	3.98	2.02			677,200	3.97		2.01
677,550	3.98	2.02			677,550	3.97		2.01
677,900	3.98	2.02			677,900	3.97		2.01
678,250	3.99	2.02			678,250	3.97		2.01
678,600	3.99	2.02			678,600	3.97		2.01
678,950	3.99	2.02			678,950	3.97		2.01
679,300	3.99	2.02			679,300	3.97		2.01
679,650	3.99	2.02			679,650	3.97		2.01
680,000	3.99	2.02			680,000	3.97		2.01
680,350	3.99	2.02			680,350	3.97		2.01
680,700	3.99	2.02			680,700	3.97		2.01
681,050	3.99	2.02			681,050	3.97		2.01
681,400	3.99	2.02			681,400	3.97		2.01
681,750	3.99	2.02			681,750	3.97		2.01
682,100	3.99	2.02			682,100	3.97		2.01
682,450	3.99	2.02			682,450	3.97		2.01
682,800	3.99	2.02			682,800	3.97		2.01
683,150	3.99	2.02			683,150	3.97		2.02
683,500	3.99	2.02			683,500	3.97		2.02
683,850	3.99	2.02			683,850	3.97		2.02
684,200	3.99	2.02			684,200	3.97		2.02

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
684,550	3.99	2.03			***684,550***	3.97		2.02
684,900	3.99	2.03			***684,900***	3.98		2.02
685,250	3.99	2.03			***685,250***	3.98		2.02
685,600	4.00	2.03			***685,600***	3.98		2.02
685,950	4.00	2.03			***685,950***	3.98		2.02
686,300	4.00	2.03			***686,300***	3.98		2.02
686,650	4.00	2.03			***686,650***	3.98		2.02
687,000	4.00	2.03			***687,000***	3.98		2.02
687,350	4.00	2.03			***687,350***	3.98		2.02
687,700	4.00	2.03			***687,700***	3.98		2.02
688,050	4.00	2.03			***688,050***	3.98		2.03
688,400	4.00	2.03			***688,400***	3.98		2.03
688,750	4.00	2.03			***688,750***	3.98		2.03
689,100	4.00	2.04			***689,100***	3.98		2.03
689,450	4.00	2.04			***689,450***	3.99		2.03
689,800	4.00	2.04			***689,800***	3.99		2.03
690,150	4.01	2.04			***690,150***	3.99		2.03
690,500	4.01	2.04			***690,500***	3.99		2.03
690,850	4.01	2.04			***690,850***	3.99		2.03
691,200	4.01	2.04			***691,200***	3.99		2.03
691,550	4.01	2.04			***691,550***	3.99		2.03
691,900	4.01	2.04			***691,900***	3.99		2.03
692,250	4.01	2.04			***692,250***	3.99		2.03
692,600	4.01	2.04			***692,600***	3.99		2.03
692,950	4.01	2.04			***692,950***	3.99		2.03
693,300	4.01	2.04			***693,300***	3.99		2.03
693,650	4.01	2.04			***693,650***	3.99		2.03
694,000	4.01	2.04			***694,000***	3.99		2.04
694,350	4.01	2.04			***694,350***	3.99		2.04
694,700	4.01	2.04			***694,700***	3.99		2.04
695,050	4.01	2.04			***695,050***	3.99		2.04
695,400	4.01	2.04			***695,400***	3.99		2.04
695,750	4.01	2.04			***695,750***	3.99		2.04
696,100	4.01	2.05			***696,100***	3.99		2.04
696,450	4.01	2.05			***696,450***	3.99		2.04
696,800	4.01	2.05			***696,800***	3.99		2.04
697,150	4.01	2.05			***697,150***	3.99		2.04
697,500	4.01	2.05			***697,500***	4.00		2.04
697,850	4.01	2.05			***697,850***	4.00		2.04
698,200	4.01	2.05			***698,200***	4.00		2.04
698,550	4.01	2.05			***698,550***	4.00		2.04
698,900	4.02	2.05			***698,900***	4.00		2.04
699,250	4.02	2.05			***699,250***	4.00		2.04
699,600	4.02	2.05			***699,600***	4.00		2.04
699,950	4.02	2.05			***699,950***	4.00		2.04
700,300	4.02	2.05			***700,300***	4.00		2.04
700,650	4.02	2.05			***700,650***	4.00		2.04
701,000	4.02	2.05			***701,000***	4.00		2.04
701,350	4.02	2.05			***701,350***	4.00		2.04
701,700	4.02	2.05			***701,700***	4.00		2.04
702,050	4.02	2.05			***702,050***	4.00		2.04

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
702,400	4.02	2.05			702,400	4.00		2.04
702,750	4.02	2.05			702,750	4.00		2.05
703,100	4.02	2.05			703,100	4.00		2.05
703,450	4.02	2.05			703,450	4.00		2.05
703,800	4.02	2.05			703,800	4.00		2.05
704,150	4.02	2.05			704,150	4.00		2.05
704,500	4.02	2.05			704,500	4.00		2.05
704,850	4.02	2.06			704,850	4.00		2.05
705,200	4.02	2.06			705,200	4.00		2.05
705,550	4.02	2.06			705,550	4.00		2.05
705,900	4.02	2.06			705,900	4.00		2.05
706,250	4.02	2.06			706,250	4.00		2.05
706,600	4.02	2.06			706,600	4.01		2.05
706,950	4.02	2.06			706,950	4.01		2.05
707,300	4.02	2.06			707,300	4.01		2.05
707,650	4.02	2.06			707,650	4.01		2.05
708,000	4.03	2.06			708,000	4.01		2.05
708,350	4.03	2.06			708,350	4.01		2.05
708,700	4.03	2.06			708,700	4.01		2.05
709,050	4.03	2.06			709,050	4.01		2.05
709,400	4.03	2.06			709,400	4.01		2.05
709,750	4.03	2.06			709,750	4.01		2.05
710,100	4.03	2.06			710,100	4.01		2.05
710,450	4.03	2.06			710,450	4.01		2.05
710,800	4.03	2.06			710,800	4.01		2.05
711,150	4.03	2.06			711,150	4.01		2.05
711,500	4.03	2.06			711,500	4.01		2.06
711,850	4.03	2.06			711,850	4.01		2.06
712,200	4.03	2.06			712,200	4.01		2.06
712,550	4.03	2.06			712,550	4.01		2.06
712,900	4.03	2.06			712,900	4.01		2.06
713,250	4.03	2.07			713,250	4.01		2.06
713,600	4.03	2.07			713,600	4.01		2.06
713,950	4.03	2.07			713,950	4.01		2.06
714,300	4.03	2.07			714,300	4.01		2.06
714,650	4.03	2.07			714,650	4.01		2.06
715,000	4.03	2.07			715,000	4.01		2.06
715,350	4.03	2.07			715,350	4.01		2.06
715,700	4.03	2.07			715,700	4.02		2.06
716,050	4.03	2.07			716,050	4.02		2.06
716,400	4.03	2.07			716,400	4.02		2.06
716,750	4.04	2.07			716,750	4.02		2.06
717,100	4.04	2.07			717,100	4.02		2.06
717,450	4.04	2.07			717,450	4.02		2.06
717,800	4.04	2.07			717,800	4.02		2.06
718,150	4.04	2.07			718,150	4.02		2.06
718,500	4.04	2.07			718,500	4.02		2.06
718,850	4.04	2.07			718,850	4.02		2.06
719,200	4.04	2.07			719,200	4.02		2.06
719,550	4.04	2.07			719,550	4.02		2.06
719,900	4.04	2.07			719,900	4.02		2.06

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
720,250	4.04	2.07			720,250	4.02		2.07
720,600	4.04	2.07			720,600	4.02		2.07
720,950	4.04	2.07			720,950	4.02		2.07
721,300	4.04	2.07			721,300	4.02		2.07
721,650	4.04	2.07			721,650	4.02		2.07
722,000	4.04	2.08			722,000	4.02		2.07
722,350	4.04	2.08			722,350	4.02		2.07
722,700	4.04	2.08			722,700	4.02		2.07
723,050	4.04	2.08			723,050	4.02		2.07
723,400	4.04	2.08			723,400	4.03		2.07
723,750	4.05	2.08			723,750	4.03		2.07
724,100	4.05	2.08			724,100	4.03		2.07
724,450	4.05	2.08			724,450	4.03		2.07
724,800	4.05	2.08			724,800	4.03		2.07
725,150	4.05	2.08			725,150	4.03		2.07
725,500	4.05	2.08			725,500	4.03		2.08
725,850	4.05	2.08			725,850	4.03		2.08
726,200	4.05	2.09			726,200	4.03		2.08
726,550	4.05	2.09			726,550	4.03		2.08
726,900	4.05	2.09			726,900	4.03		2.08
727,250	4.05	2.09			727,250	4.03		2.08
727,600	4.05	2.09			727,600	4.04		2.08
727,950	4.05	2.09			727,950	4.04		2.08
728,300	4.05	2.09			728,300	4.04		2.08
728,650	4.06	2.09			728,650	4.04		2.08
729,000	4.06	2.09			729,000	4.04		2.08
729,350	4.06	2.09			729,350	4.04		2.08
729,700	4.06	2.09			729,700	4.04		2.08
730,050	4.06	2.09			730,050	4.04		2.08
730,400	4.06	2.09			730,400	4.04		2.08
730,750	4.06	2.09			730,750	4.04		2.08
731,100	4.06	2.09			731,100	4.04		2.09
731,450	4.06	2.09			731,450	4.04		2.09
731,800	4.06	2.09			731,800	4.04		2.09
732,150	4.06	2.09			732,150	4.04		2.09
732,500	4.06	2.09			732,500	4.04		2.09
732,850	4.06	2.09			732,850	4.04		2.09
733,200	4.06	2.10			733,200	4.04		2.09
733,550	4.06	2.10			733,550	4.04		2.09
733,900	4.06	2.10			733,900	4.04		2.09
734,250	4.06	2.10			734,250	4.04		2.09
734,600	4.06	2.10			734,600	4.04		2.09
734,950	4.06	2.10			734,950	4.04		2.09
735,300	4.06	2.10			735,300	4.04		2.09
735,650	4.06	2.10			735,650	4.04		2.09
736,000	4.06	2.10			736,000	4.04		2.09
736,350	4.06	2.10			736,350	4.05		2.09
736,700	4.06	2.10			736,700	4.05		2.09
737,050	4.06	2.10			737,050	4.05		2.09
737,400	4.07	2.10			737,400	4.05		2.09
737,750	4.07	2.10			737,750	4.05		2.09

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
738,100	4.07	2.10			738,100	4.05		2.09
738,450	4.07	2.10			738,450	4.05		2.09
738,800	4.07	2.10			738,800	4.05		2.09
739,150	4.07	2.10			739,150	4.05		2.09
739,500	4.07	2.10			739,500	4.05		2.09
739,850	4.07	2.10			739,850	4.05		2.10
740,200	4.07	2.10			740,200	4.05		2.10
740,550	4.07	2.10			740,550	4.05		2.10
740,900	4.07	2.10			740,900	4.05		2.10
741,250	4.07	2.10			741,250	4.05		2.10
741,600	4.07	2.11			741,600	4.05		2.10
741,950	4.07	2.11			741,950	4.05		2.10
742,300	4.07	2.11			742,300	4.05		2.10
742,650	4.07	2.11			742,650	4.05		2.10
743,000	4.07	2.11			743,000	4.05		2.10
743,350	4.07	2.11			743,350	4.05		2.10
743,700	4.07	2.11			743,700	4.05		2.10
744,050	4.07	2.11			744,050	4.05		2.10
744,400	4.07	2.11			744,400	4.05		2.10
744,750	4.07	2.11			744,750	4.05		2.10
745,100	4.07	2.11			745,100	4.06		2.10
745,450	4.07	2.11			745,450	4.06		2.10
745,800	4.07	2.11			745,800	4.06		2.10
746,150	4.07	2.11			746,150	4.06		2.10
746,500	4.08	2.11			746,500	4.06		2.10
746,850	4.08	2.11			746,850	4.06		2.10
747,200	4.08	2.11			747,200	4.06		2.10
747,550	4.08	2.11			747,550	4.06		2.10
747,900	4.08	2.11			747,900	4.06		2.10
748,250	4.08	2.11			748,250	4.06		2.10
748,600	4.08	2.11			748,600	4.06		2.11
748,950	4.08	2.11			748,950	4.06		2.11
749,300	4.08	2.11			749,300	4.06		2.11
749,650	4.08	2.11			749,650	4.06		2.11
750,000	4.08	2.11			750,000	4.06		2.11
750,350	4.08	2.12			750,350	4.06		2.11
750,700	4.08	2.12			750,700	4.06		2.11
751,050	4.08	2.12			751,050	4.06		2.11
751,400	4.08	2.12			751,400	4.06		2.11
751,750	4.08	2.12			751,750	4.06		2.11
752,100	4.08	2.12			752,100	4.06		2.11
752,450	4.08	2.12			752,450	4.06		2.11
752,800	4.08	2.12			752,800	4.06		2.11
753,150	4.08	2.12			753,150	4.06		2.11
753,500	4.08	2.12			753,500	4.06		2.11
753,850	4.08	2.12			753,850	4.06		2.11
754,200	4.08	2.12			754,200	4.07		2.11
754,550	4.08	2.12			754,550	4.07		2.11
754,900	4.08	2.12			754,900	4.07		2.11
755,250	4.08	2.12			755,250	4.07		2.11
755,600	4.09	2.12			755,600	4.07		2.11

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
755,950	4.09	2.12			755,950	4.07		2.11
756,300	4.09	2.12			756,300	4.07		2.11
756,650	4.09	2.12			756,650	4.07		2.11
757,000	4.09	2.12			757,000	4.07		2.12
757,350	4.09	2.12			757,350	4.07		2.12
757,700	4.09	2.12			757,700	4.07		2.12
758,050	4.09	2.12			758,050	4.07		2.12
758,400	4.09	2.12			758,400	4.07		2.12
758,750	4.09	2.12			758,750	4.07		2.12
759,100	4.09	2.13			759,100	4.07		2.12
759,450	4.09	2.13			759,450	4.07		2.12
759,800	4.09	2.13			759,800	4.07		2.12
760,150	4.09	2.13			760,150	4.07		2.12
760,500	4.09	2.13			760,500	4.07		2.12
760,850	4.09	2.13			760,850	4.07		2.12
761,200	4.09	2.13			761,200	4.07		2.12
761,550	4.09	2.13			761,550	4.07		2.12
761,900	4.09	2.13			761,900	4.07		2.12
762,250	4.09	2.13			762,250	4.07		2.12
762,600	4.09	2.13			762,600	4.07		2.12
762,950	4.09	2.13			762,950	4.07		2.12
763,300	4.09	2.13			763,300	4.08		2.12
763,650	4.09	2.13			763,650	4.08		2.12
764,000	4.09	2.13			764,000	4.08		2.12
764,350	4.10	2.13			764,350	4.08		2.12
764,700	4.10	2.13			764,700	4.08		2.12
765,050	4.10	2.13			765,050	4.08		2.12
765,400	4.10	2.13			765,400	4.08		2.12
765,750	4.10	2.13			765,750	4.08		2.13
766,100	4.10	2.13			766,100	4.08		2.13
766,450	4.10	2.13			766,450	4.08		2.13
766,800	4.10	2.13			766,800	4.08		2.13
767,150	4.10	2.13			767,150	4.08		2.13
767,500	4.10	2.13			767,500	4.08		2.13
767,850	4.10	2.14			767,850	4.08		2.13
768,200	4.10	2.14			768,200	4.08		2.13
768,550	4.10	2.14			768,550	4.08		2.13
768,900	4.10	2.14			768,900	4.08		2.13
769,250	4.10	2.14			769,250	4.08		2.13
769,600	4.10	2.14			769,600	4.08		2.13
769,950	4.10	2.14			769,950	4.08		2.13
770,300	4.10	2.14			770,300	4.08		2.13
770,650	4.10	2.14			770,650	4.08		2.13
771,000	4.10	2.14			771,000	4.08		2.13
771,350	4.10	2.14			771,350	4.08		2.13
771,700	4.10	2.14			771,700	4.08		2.13
772,050	4.10	2.14			772,050	4.09		2.13
772,400	4.10	2.14			772,400	4.09		2.13
772,750	4.10	2.14			772,750	4.09		2.13
773,100	4.10	2.14			773,100	4.09		2.13
773,450	4.11	2.14			773,450	4.09		2.13

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
773,800	4.11	2.14			773,800	4.09		2.13
774,150	4.11	2.14			774,150	4.09		2.13
774,500	4.11	2.14			774,500	4.09		2.14
774,850	4.11	2.14			774,850	4.09		2.14
775,200	4.11	2.14			775,200	4.09		2.14
775,550	4.11	2.14			775,550	4.09		2.14
775,900	4.11	2.14			775,900	4.09		2.14
776,250	4.11	2.14			776,250	4.09		2.14
776,600	4.11	2.15			776,600	4.09		2.14
776,950	4.11	2.15			776,950	4.09		2.14
777,300	4.11	2.15			777,300	4.09		2.14
777,650	4.11	2.15			777,650	4.09		2.14
778,000	4.11	2.15			778,000	4.09		2.14
778,350	4.11	2.15			778,350	4.09		2.14
778,700	4.11	2.15			778,700	4.09		2.14
779,050	4.11	2.15			779,050	4.09		2.14
779,400	4.11	2.15			779,400	4.09		2.14
779,750	4.11	2.15			779,750	4.09		2.14
780,100	4.11	2.15			780,100	4.09		2.14
780,450	4.11	2.15			780,450	4.09		2.14
780,800	4.11	2.15			780,800	4.09		2.14
781,150	4.11	2.15			781,150	4.10		2.14
781,500	4.11	2.15			781,500	4.10		2.14
781,850	4.11	2.15			781,850	4.10		2.14
782,200	4.11	2.15			782,200	4.10		2.14
782,550	4.12	2.15			782,550	4.10		2.14
782,900	4.12	2.15			782,900	4.10		2.14
783,250	4.12	2.15			783,250	4.10		2.15
783,600	4.12	2.15			783,600	4.10		2.15
783,950	4.12	2.15			783,950	4.10		2.15
784,300	4.12	2.15			784,300	4.10		2.15
784,650	4.12	2.15			784,650	4.10		2.15
785,000	4.12	2.16			785,000	4.10		2.15
785,350	4.12	2.16			785,350	4.10		2.15
785,700	4.12	2.16			785,700	4.10		2.15
786,050	4.12	2.16			786,050	4.10		2.15
786,400	4.12	2.16			786,400	4.10		2.15
786,750	4.12	2.16			786,750	4.10		2.15
787,100	4.12	2.16			787,100	4.10		2.15
787,450	4.12	2.16			787,450	4.10		2.15
787,800	4.12	2.16			787,800	4.10		2.15
788,150	4.12	2.16			788,150	4.10		2.15
788,500	4.12	2.16			788,500	4.10		2.15
788,850	4.12	2.16			788,850	4.10		2.15
789,200	4.12	2.16			789,200	4.10		2.15
789,550	4.12	2.16			789,550	4.10		2.15
789,900	4.12	2.16			789,900	4.10		2.15
790,250	4.12	2.16			790,250	4.11		2.15
790,600	4.12	2.16			790,600	4.11		2.15
790,950	4.12	2.16			790,950	4.11		2.15
791,300	4.13	2.16			791,300	4.11		2.15

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
791,650	4.13	2.16			791,650	4.11		2.15
792,000	4.13	2.16			792,000	4.11		2.16
792,350	4.13	2.16			792,350	4.11		2.16
792,700	4.13	2.16			792,700	4.11		2.16
793,050	4.13	2.16			793,050	4.11		2.16
793,400	4.13	2.16			793,400	4.11		2.16
793,750	4.13	2.17			793,750	4.11		2.16
794,100	4.13	2.17			794,100	4.11		2.16
794,450	4.13	2.17			794,450	4.11		2.16
794,800	4.13	2.17			794,800	4.11		2.16
795,150	4.13	2.17			795,150	4.11		2.16
795,500	4.13	2.17			795,500	4.11		2.16
795,850	4.13	2.17			795,850	4.11		2.16
796,200	4.13	2.17			796,200	4.11		2.16
796,550	4.13	2.17			796,550	4.11		2.16
796,900	4.13	2.17			796,900	4.11		2.16
797,250	4.13	2.17			797,250	4.11		2.16
797,600	4.13	2.17			797,600	4.11		2.16
797,950	4.13	2.17			797,950	4.11		2.16
798,300	4.13	2.17			798,300	4.11		2.16
798,650	4.13	2.17			798,650	4.11		2.16
799,000	4.13	2.17			799,000	4.11		2.16
799,350	4.13	2.17			799,350	4.12		2.16
799,700	4.13	2.17			799,700	4.12		2.16
800,050	4.13	2.17			800,050	4.12		2.16
800,400	4.14	2.17			800,400	4.12		2.17
800,750	4.14	2.17			800,750	4.12		2.17
801,100	4.14	2.17			801,100	4.12		2.17
801,450	4.14	2.17			801,450	4.12		2.17
801,800	4.14	2.17			801,800	4.12		2.17
802,150	4.14	2.17			802,150	4.12		2.17
802,500	4.14	2.18			802,500	4.12		2.17
802,850	4.14	2.18			802,850	4.12		2.17
803,200	4.14	2.18			803,200	4.12		2.17
803,550	4.14	2.18			803,550	4.12		2.17
803,900	4.14	2.18			803,900	4.12		2.17
804,250	4.14	2.18			804,250	4.12		2.17
804,600	4.14	2.18			804,600	4.12		2.17
804,950	4.14	2.18			804,950	4.12		2.17
805,300	4.14	2.18			805,300	4.12		2.17
805,650	4.14	2.18			805,650	4.12		2.17
806,000	4.14	2.18			806,000	4.12		2.17
806,350	4.14	2.18			806,350	4.12		2.17
806,700	4.14	2.18			806,700	4.12		2.17
807,050	4.14	2.18			807,050	4.12		2.17
807,400	4.14	2.18			807,400	4.12		2.17
807,750	4.14	2.18			807,750	4.12		2.17
808,100	4.14	2.18			808,100	4.13		2.17
808,450	4.14	2.18			808,450	4.13		2.17
808,800	4.14	2.18			808,800	4.13		2.17
809,150	4.14	2.18			809,150	4.13		2.18

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
809,500	4.15	2.18			809,500	4.13		2.18
809,850	4.15	2.18			809,850	4.13		2.18
810,200	4.15	2.18			810,200	4.13		2.18
810,550	4.15	2.18			810,550	4.13		2.18
810,900	4.15	2.18			810,900	4.13		2.18
811,250	4.15	2.19			811,250	4.13		2.18
811,600	4.15	2.19			811,600	4.13		2.18
811,950	4.15	2.19			811,950	4.13		2.18
812,300	4.15	2.19			812,300	4.13		2.18
812,650	4.15	2.19			812,650	4.13		2.18
813,000	4.15	2.19			813,000	4.13		2.18
813,350	4.15	2.19			813,350	4.13		2.18
813,700	4.15	2.19			813,700	4.13		2.18
814,050	4.15	2.19			814,050	4.13		2.18
814,400	4.15	2.19			814,400	4.13		2.18
814,750	4.15	2.19			814,750	4.13		2.18
815,100	4.15	2.19			815,100	4.13		2.18
815,450	4.15	2.19			815,450	4.13		2.18
815,800	4.15	2.19			815,800	4.13		2.18
816,150	4.15	2.19			816,150	4.13		2.18
816,500	4.15	2.19			816,500	4.13		2.18
816,850	4.15	2.19			816,850	4.13		2.18
817,200	4.15	2.19			817,200	4.14		2.18
817,550	4.15	2.19			817,550	4.14		2.18
817,900	4.15	2.19			817,900	4.14		2.19
818,250	4.15	2.19			818,250	4.14		2.19
818,600	4.16	2.19			818,600	4.14		2.19
818,950	4.16	2.19			818,950	4.14		2.19
819,300	4.16	2.19			819,300	4.14		2.19
819,650	4.16	2.19			819,650	4.14		2.19
820,000	4.16	2.20			820,000	4.14		2.19
820,350	4.16	2.20			820,350	4.14		2.19
820,700	4.16	2.20			820,700	4.14		2.19
821,050	4.16	2.20			821,050	4.14		2.19
821,400	4.16	2.20			821,400	4.14		2.19
821,750	4.16	2.20			821,750	4.14		2.19
822,100	4.16	2.20			822,100	4.14		2.19
822,450	4.16	2.20			822,450	4.14		2.19
822,800	4.16	2.20			822,800	4.14		2.19
823,150	4.16	2.20			823,150	4.14		2.19
823,500	4.16	2.20			823,500	4.14		2.19
823,850	4.16	2.20			823,850	4.14		2.19
824,200	4.16	2.20			824,200	4.14		2.19
824,550	4.16	2.20			824,550	4.14		2.19
824,900	4.16	2.20			824,900	4.14		2.19
825,250	4.16	2.20			825,250	4.14		2.19
825,600	4.16	2.20			825,600	4.14		2.19
825,950	4.16	2.20			825,950	4.14		2.19
826,300	4.16	2.20			826,300	4.15		2.19
826,650	4.16	2.20			826,650	4.15		2.20
827,000	4.16	2.20			827,000	4.15		2.20

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
827,350	4.17	2.20			827,350	4.15		2.20
827,700	4.17	2.20			827,700	4.15		2.20
828,050	4.17	2.20			828,050	4.15		2.20
828,400	4.17	2.20			828,400	4.15		2.20
828,750	4.17	2.21			828,750	4.15		2.20
829,100	4.17	2.21			829,100	4.15		2.20
829,450	4.17	2.21			829,450	4.15		2.20
829,800	4.17	2.21			829,800	4.15		2.20
830,150	4.17	2.21			830,150	4.15		2.20
830,500	4.17	2.21			830,500	4.15		2.20
830,850	4.17	2.21			830,850	4.15		2.20
831,200	4.17	2.21			831,200	4.15		2.20
831,550	4.17	2.21			831,550	4.15		2.20
831,900	4.17	2.21			831,900	4.15		2.20
832,250	4.17	2.21			832,250	4.15		2.20
832,600	4.17	2.21			832,600	4.15		2.20
832,950	4.17	2.21			832,950	4.15		2.20
833,300	4.17	2.21			833,300	4.15		2.20
833,650	4.17	2.21			833,650	4.15		2.20
834,000	4.17	2.21			834,000	4.15		2.20
834,350	4.17	2.21			834,350	4.15		2.20
834,700	4.17	2.21			834,700	4.15		2.20
835,050	4.17	2.21			835,050	4.15		2.20
835,400	4.17	2.21			835,400	4.16		2.21
835,750	4.17	2.21			835,750	4.16		2.21
836,100	4.17	2.21			836,100	4.16		2.21
836,450	4.18	2.21			836,450	4.16		2.21
836,800	4.18	2.21			836,800	4.16		2.21
837,150	4.18	2.22			837,150	4.16		2.21
837,500	4.18	2.22			837,500	4.16		2.21
837,850	4.18	2.22			837,850	4.16		2.21
838,200	4.18	2.22			838,200	4.16		2.21
838,550	4.18	2.22			838,550	4.16		2.21
838,900	4.18	2.22			838,900	4.16		2.21
839,250	4.18	2.22			839,250	4.16		2.21
839,600	4.18	2.22			839,600	4.16		2.21
839,950	4.18	2.22			839,950	4.16		2.21
840,300	4.18	2.22			840,300	4.16		2.21
840,650	4.18	2.22			840,650	4.16		2.21
841,000	4.18	2.22			841,000	4.16		2.21
841,350	4.18	2.22			841,350	4.16		2.21
841,700	4.18	2.22			841,700	4.16		2.21
842,050	4.18	2.22			842,050	4.16		2.21
842,400	4.18	2.22			842,400	4.16		2.21
842,750	4.18	2.22			842,750	4.16		2.21
843,100	4.18	2.22			843,100	4.16		2.21
843,450	4.18	2.22			843,450	4.16		2.21
843,800	4.18	2.22			843,800	4.16		2.21
844,150	4.18	2.22			844,150	4.17		2.22
844,500	4.18	2.22			844,500	4.17		2.22
844,850	4.18	2.22			844,850	4.17		2.22

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
845,200	4.18	2.22			845,200	4.17		2.22
845,550	4.19	2.22			845,550	4.17		2.22
845,900	4.19	2.23			845,900	4.17		2.22
846,250	4.19	2.23			846,250	4.17		2.22
846,600	4.19	2.23			846,600	4.17		2.22
846,950	4.19	2.23			846,950	4.17		2.22
847,300	4.19	2.23			847,300	4.17		2.22
847,650	4.19	2.23			847,650	4.17		2.22
848,000	4.19	2.23			848,000	4.17		2.22
848,350	4.19	2.23			848,350	4.17		2.22
848,700	4.19	2.23			848,700	4.17		2.22
849,050	4.19	2.23			849,050	4.17		2.22
849,400	4.19	2.23			849,400	4.17		2.22
849,750	4.19	2.23			849,750	4.17		2.22
850,100	4.19	2.23			850,100	4.17		2.22
850,450	4.19	2.23			850,450	4.17		2.22
850,800	4.19	2.23			850,800	4.17		2.22
851,150	4.19	2.23			851,150	4.17		2.22
851,500	4.19	2.23			851,500	4.17		2.22
851,850	4.19	2.23			851,850	4.17		2.22
852,200	4.19	2.23			852,200	4.17		2.22
852,550	4.19	2.23			852,550	4.17		2.22
852,900	4.19	2.23			852,900	4.17		2.23
853,250	4.19	2.23			853,250	4.18		2.23
853,600	4.19	2.23			853,600	4.18		2.23
853,950	4.19	2.23			853,950	4.18		2.23
854,300	4.19	2.23			854,300	4.18		2.23
854,650	4.20	2.24			854,650	4.18		2.23
855,000	4.20	2.24			855,000	4.18		2.23
855,350	4.20	2.24			855,350	4.18		2.23
855,700	4.20	2.24			855,700	4.18		2.23
856,050	4.20	2.24			856,050	4.18		2.23
856,400	4.20	2.24			856,400	4.18		2.23
856,750	4.20	2.24			856,750	4.18		2.23
857,100	4.20	2.24			857,100	4.18		2.23
857,450	4.20	2.24			857,450	4.18		2.23
857,800	4.20	2.24			857,800	4.18		2.23
858,150	4.20	2.24			858,150	4.18		2.23
858,500	4.20	2.24			858,500	4.18		2.23
858,850	4.20	2.24			858,850	4.18		2.23
859,200	4.20	2.24			859,200	4.18		2.23
859,550	4.20	2.24			859,550	4.18		2.23
859,900	4.20	2.24			859,900	4.18		2.23
860,250	4.20	2.24			860,250	4.18		2.23
860,600	4.20	2.24			860,600	4.18		2.23
860,950	4.20	2.24			860,950	4.18		2.23
861,300	4.20	2.24			861,300	4.18		2.23
861,650	4.20	2.24			861,650	4.18		2.23
862,000	4.20	2.24			862,000	4.18		2.23
862,350	4.20	2.24			862,350	4.18		2.23
862,700	4.20	2.24			862,700	4.18		2.23

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
863,050	4.20	2.24			863,050	4.18		2.23
863,400	4.20	2.24			863,400	4.18		2.23
863,750	4.20	2.24			863,750	4.18		2.23
864,100	4.20	2.24			864,100	4.18		2.24
864,450	4.20	2.24			864,450	4.18		2.24
864,800	4.20	2.24			864,800	4.18		2.24
865,150	4.20	2.24			865,150	4.18		2.24
865,500	4.20	2.24			865,500	4.19		2.24
865,850	4.20	2.24			865,850	4.19		2.24
866,200	4.20	2.24			866,200	4.19		2.24
866,550	4.20	2.25			866,550	4.19		2.24
866,900	4.20	2.25			866,900	4.19		2.24
867,250	4.21	2.25			867,250	4.19		2.24
867,600	4.21	2.25			867,600	4.19		2.24
867,950	4.21	2.25			867,950	4.19		2.24
868,300	4.21	2.25			868,300	4.19		2.24
868,650	4.21	2.25			868,650	4.19		2.24
869,000	4.21	2.25			869,000	4.19		2.24
869,350	4.21	2.25			869,350	4.19		2.24
869,700	4.21	2.25			869,700	4.19		2.24
870,050	4.21	2.25			870,050	4.19		2.24
870,400	4.21	2.25			870,400	4.19		2.24
870,750	4.21	2.25			870,750	4.19		2.24
871,100	4.21	2.25			871,100	4.19		2.24
871,450	4.21	2.25			871,450	4.19		2.25
871,800	4.21	2.25			871,800	4.19		2.25
872,150	4.21	2.25			872,150	4.19		2.25
872,500	4.21	2.25			872,500	4.20		2.25
872,850	4.21	2.26			872,850	4.20		2.25
873,200	4.22	2.26			873,200	4.20		2.25
873,550	4.22	2.26			873,550	4.20		2.25
873,900	4.22	2.26			873,900	4.20		2.25
874,250	4.22	2.26			874,250	4.20		2.25
874,600	4.22	2.26			874,600	4.20		2.25
874,950	4.22	2.26			874,950	4.20		2.25
875,300	4.22	2.26			875,300	4.20		2.25
875,650	4.22	2.26			875,650	4.20		2.25
876,000	4.22	2.26			876,000	4.20		2.25
876,350	4.22	2.26			876,350	4.20		2.25
876,700	4.22	2.26			876,700	4.20		2.25
877,050	4.22	2.26			877,050	4.20		2.25
877,400	4.22	2.26			877,400	4.20		2.25
877,750	4.22	2.26			877,750	4.20		2.25
878,100	4.22	2.26			878,100	4.20		2.25
878,450	4.22	2.26			878,450	4.20		2.25
878,800	4.22	2.26			878,800	4.20		2.25
879,150	4.22	2.26			879,150	4.20		2.25
879,500	4.22	2.26			879,500	4.20		2.25
879,850	4.22	2.26			879,850	4.20		2.25
880,200	4.22	2.26			880,200	4.20		2.25
880,550	4.22	2.26			880,550	4.20		2.25

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
880,900	4.22	2.26			880,900	4.20		2.25
881,250	4.22	2.26			881,250	4.20		2.25
881,600	4.22	2.26			881,600	4.20		2.26
881,950	4.22	2.26			881,950	4.20		2.26
882,300	4.22	2.26			882,300	4.20		2.26
882,650	4.22	2.26			882,650	4.20		2.26
883,000	4.22	2.26			883,000	4.20		2.26
883,350	4.22	2.26			883,350	4.20		2.26
883,700	4.22	2.26			883,700	4.20		2.26
884,050	4.22	2.27			884,050	4.21		2.26
884,400	4.22	2.27			884,400	4.21		2.26
884,750	4.22	2.27			884,750	4.21		2.26
885,100	4.22	2.27			885,100	4.21		2.26
885,450	4.22	2.27			885,450	4.21		2.26
885,800	4.23	2.27			885,800	4.21		2.26
886,150	4.23	2.27			886,150	4.21		2.26
886,500	4.23	2.27			886,500	4.21		2.26
886,850	4.23	2.27			886,850	4.21		2.26
887,200	4.23	2.27			887,200	4.21		2.26
887,550	4.23	2.27			887,550	4.21		2.26
887,900	4.23	2.27			887,900	4.21		2.26
888,250	4.23	2.27			888,250	4.21		2.26
888,600	4.23	2.27			888,600	4.21		2.26
888,950	4.23	2.27			888,950	4.21		2.26
889,300	4.23	2.27			889,300	4.21		2.26
889,650	4.23	2.27			889,650	4.21		2.26
890,000	4.23	2.27			890,000	4.21		2.26
890,350	4.23	2.27			890,350	4.21		2.26
890,700	4.23	2.27			890,700	4.21		2.26
891,050	4.23	2.27			891,050	4.21		2.26
891,400	4.23	2.27			891,400	4.21		2.26
891,750	4.23	2.27			891,750	4.21		2.26
892,100	4.23	2.27			892,100	4.21		2.26
892,450	4.23	2.27			892,450	4.21		2.26
892,800	4.23	2.27			892,800	4.21		2.26
893,150	4.23	2.27			893,150	4.21		2.26
893,500	4.23	2.27			893,500	4.21		2.27
893,850	4.23	2.27			893,850	4.21		2.27
894,200	4.23	2.27			894,200	4.21		2.27
894,550	4.23	2.27			894,550	4.21		2.27
894,900	4.23	2.27			894,900	4.21		2.27
895,250	4.23	2.27			895,250	4.21		2.27
895,600	4.23	2.27			895,600	4.21		2.27
895,950	4.23	2.28			895,950	4.21		2.27
896,300	4.23	2.28			896,300	4.21		2.27
896,650	4.23	2.28			896,650	4.22		2.27
897,000	4.23	2.28			897,000	4.22		2.27
897,350	4.23	2.28			897,350	4.22		2.27
897,700	4.23	2.28			897,700	4.22		2.27
898,050	4.23	2.28			898,050	4.22		2.27
898,400	4.24	2.28			898,400	4.22		2.27

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
898,750	4.24	2.28			898,750	4.22		2.27
899,100	4.24	2.28			899,100	4.22		2.27
899,450	4.24	2.28			899,450	4.22		2.27
899,800	4.24	2.28			899,800	4.22		2.27
900,150	4.24	2.28			900,150	4.22		2.27
900,500	4.24	2.28			900,500	4.22		2.27
900,850	4.24	2.28			900,850	4.22		2.27
901,200	4.24	2.28			901,200	4.22		2.27
901,550	4.24	2.28			901,550	4.22		2.27
901,900	4.24	2.28			901,900	4.22		2.27
902,250	4.24	2.28			902,250	4.22		2.27
902,600	4.24	2.28			902,600	4.22		2.27
902,950	4.24	2.28			902,950	4.22		2.27
903,300	4.24	2.28			903,300	4.22		2.27
903,650	4.24	2.28			903,650	4.22		2.27
904,000	4.24	2.28			904,000	4.22		2.27
904,350	4.24	2.28			904,350	4.22		2.27
904,700	4.24	2.28			904,700	4.22		2.27
905,050	4.24	2.28			905,050	4.22		2.27
905,400	4.24	2.28			905,400	4.22		2.28
905,750	4.24	2.28			905,750	4.22		2.28
906,100	4.24	2.28			906,100	4.22		2.28
906,450	4.24	2.28			906,450	4.22		2.28
906,800	4.24	2.28			906,800	4.22		2.28
907,150	4.24	2.28			907,150	4.22		2.28
907,500	4.24	2.28			907,500	4.22		2.28
907,850	4.24	2.29			907,850	4.22		2.28
908,200	4.24	2.29			908,200	4.22		2.28
908,550	4.24	2.29			908,550	4.22		2.28
908,900	4.24	2.29			908,900	4.22		2.28
909,250	4.24	2.29			909,250	4.23		2.28
909,600	4.24	2.29			909,600	4.23		2.28
909,950	4.24	2.29			909,950	4.23		2.28
910,300	4.24	2.29			910,300	4.23		2.28
910,650	4.24	2.29			910,650	4.23		2.28
911,000	4.25	2.29			911,000	4.23		2.28
911,350	4.25	2.29			911,350	4.23		2.28
911,700	4.25	2.29			911,700	4.23		2.28
912,050	4.25	2.29			912,050	4.23		2.28
912,400	4.25	2.29			912,400	4.23		2.28
912,750	4.25	2.29			912,750	4.23		2.28
913,100	4.25	2.29			913,100	4.23		2.28
913,450	4.25	2.29			913,450	4.23		2.28
913,800	4.25	2.29			913,800	4.23		2.28
914,150	4.25	2.29			914,150	4.23		2.28
914,500	4.25	2.29			914,500	4.23		2.28
914,850	4.25	2.29			914,850	4.23		2.28
915,200	4.25	2.29			915,200	4.23		2.28
915,550	4.25	2.29			915,550	4.23		2.28
915,900	4.25	2.29			915,900	4.23		2.28
916,250	4.25	2.29			916,250	4.23		2.28

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
916,600	4.25	2.29			916,600	4.23		2.28
916,950	4.25	2.29			916,950	4.23		2.28
917,300	4.25	2.29			917,300	4.23		2.29
917,650	4.25	2.29			917,650	4.23		2.29
918,000	4.25	2.29			918,000	4.23		2.29
918,350	4.25	2.29			918,350	4.23		2.29
918,700	4.25	2.29			918,700	4.23		2.29
919,050	4.25	2.29			919,050	4.23		2.29
919,400	4.25	2.29			919,400	4.23		2.29
919,750	4.25	2.30			919,750	4.23		2.29
920,100	4.25	2.30			920,100	4.23		2.29
920,450	4.25	2.30			920,450	4.23		2.29
920,800	4.25	2.30			920,800	4.23		2.29
921,150	4.25	2.30			921,150	4.23		2.29
921,500	4.25	2.30			921,500	4.24		2.29
921,850	4.25	2.30			921,850	4.24		2.29
922,200	4.25	2.30			922,200	4.24		2.29
922,550	4.25	2.30			922,550	4.24		2.29
922,900	4.25	2.30			922,900	4.24		2.29
923,250	4.25	2.30			923,250	4.24		2.29
923,600	4.26	2.30			923,600	4.24		2.29
923,950	4.26	2.30			923,950	4.24		2.29
924,300	4.26	2.30			924,300	4.24		2.29
924,650	4.26	2.30			924,650	4.24		2.29
925,000	4.26	2.30			925,000	4.24		2.29
925,350	4.26	2.30			925,350	4.24		2.29
925,700	4.26	2.30			925,700	4.24		2.29
926,050	4.26	2.30			926,050	4.24		2.29
926,400	4.26	2.30			926,400	4.24		2.29
926,750	4.26	2.30			926,750	4.24		2.29
927,100	4.26	2.30			927,100	4.24		2.29
927,450	4.26	2.30			927,450	4.24		2.29
927,800	4.26	2.30			927,800	4.24		2.29
928,150	4.26	2.30			928,150	4.24		2.29
928,500	4.26	2.30			928,500	4.24		2.29
928,850	4.26	2.30			928,850	4.24		2.29
929,200	4.26	2.30			929,200	4.24		2.30
929,550	4.26	2.30			929,550	4.24		2.30
929,900	4.26	2.30			929,900	4.24		2.30
930,250	4.26	2.30			930,250	4.24		2.30
930,600	4.26	2.30			930,600	4.24		2.30
930,950	4.26	2.30			930,950	4.24		2.30
931,300	4.26	2.30			931,300	4.24		2.30
931,650	4.26	2.31			931,650	4.24		2.30
932,000	4.26	2.31			932,000	4.24		2.30
932,350	4.26	2.31			932,350	4.24		2.30
932,700	4.26	2.31			932,700	4.24		2.30
933,050	4.26	2.31			933,050	4.24		2.30
933,400	4.26	2.31			933,400	4.24		2.30
933,750	4.26	2.31			933,750	4.24		2.30
934,100	4.26	2.31			934,100	4.25		2.30

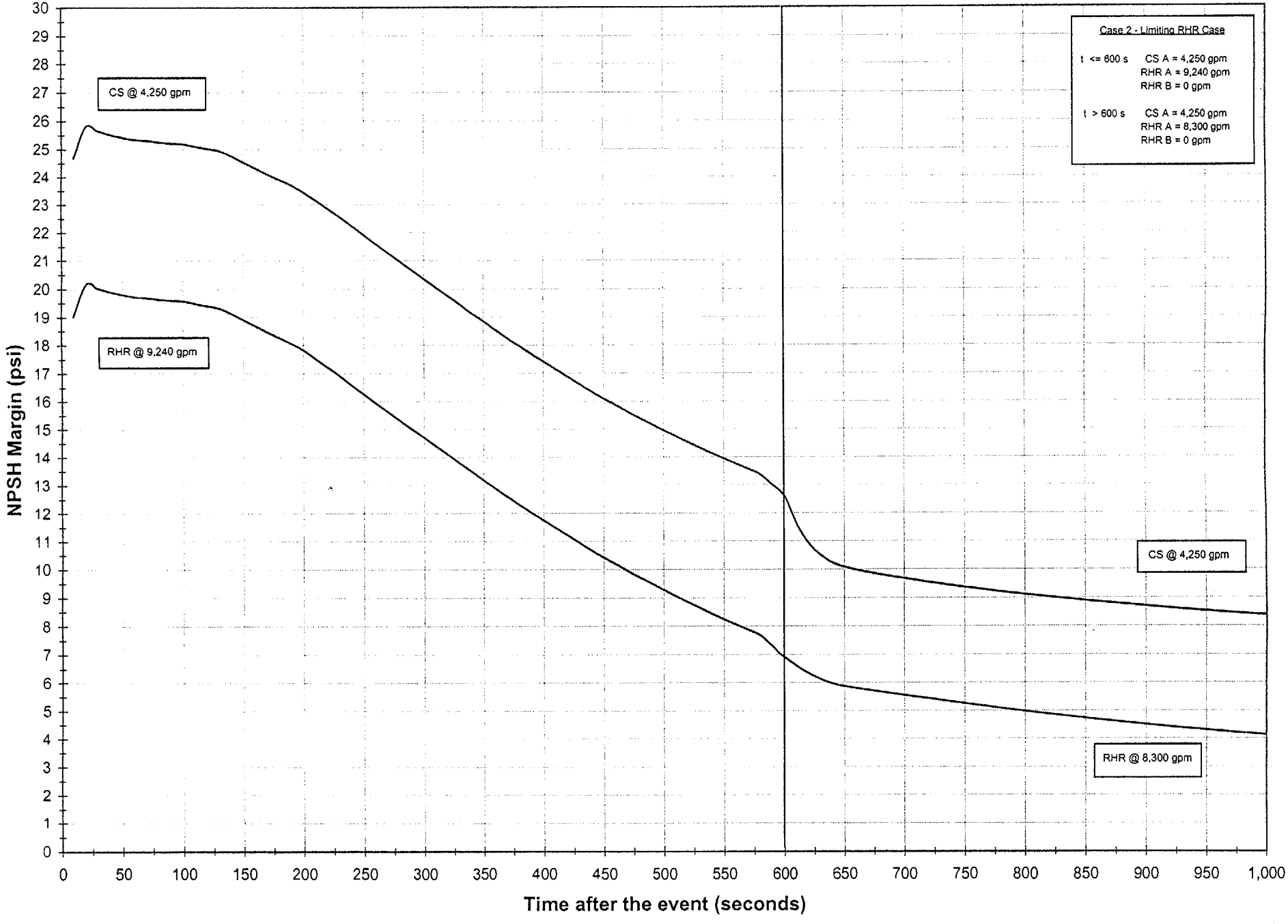
Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
934,450	4.26	2.31			934,450	4.25		2.30
934,800	4.26	2.31			934,800	4.25		2.30
935,150	4.26	2.31			935,150	4.25		2.30
935,500	4.26	2.31			935,500	4.25		2.30
935,850	4.27	2.31			935,850	4.25		2.30
936,200	4.27	2.31			936,200	4.25		2.30
936,550	4.27	2.31			936,550	4.25		2.30
936,900	4.27	2.31			936,900	4.25		2.30
937,250	4.27	2.31			937,250	4.25		2.30
937,600	4.27	2.31			937,600	4.25		2.30
937,950	4.27	2.31			937,950	4.25		2.30
938,300	4.27	2.31			938,300	4.25		2.30
938,650	4.27	2.31			938,650	4.25		2.30
939,000	4.27	2.31			939,000	4.25		2.30
939,350	4.27	2.31			939,350	4.25		2.30
939,700	4.27	2.31			939,700	4.25		2.30
940,050	4.27	2.31			940,050	4.25		2.30
940,400	4.27	2.31			940,400	4.25		2.30
940,750	4.27	2.31			940,750	4.25		2.30
941,100	4.27	2.31			941,100	4.25		2.31
941,450	4.27	2.31			941,450	4.25		2.31
941,800	4.27	2.31			941,800	4.25		2.31
942,150	4.27	2.31			942,150	4.25		2.31
942,500	4.27	2.31			942,500	4.25		2.31
942,850	4.27	2.31			942,850	4.25		2.31
943,200	4.27	2.31			943,200	4.25		2.31
943,550	4.27	2.32			943,550	4.25		2.31
943,900	4.27	2.32			943,900	4.25		2.31
944,250	4.27	2.32			944,250	4.25		2.31
944,600	4.27	2.32			944,600	4.25		2.31
944,950	4.27	2.32			944,950	4.25		2.31
945,300	4.27	2.32			945,300	4.25		2.31
945,650	4.27	2.32			945,650	4.25		2.31
946,000	4.27	2.32			946,000	4.25		2.31
946,350	4.27	2.32			946,350	4.25		2.31
946,700	4.27	2.32			946,700	4.26		2.31
947,050	4.27	2.32			947,050	4.26		2.31
947,400	4.27	2.32			947,400	4.26		2.31
947,750	4.27	2.32			947,750	4.26		2.31
948,100	4.27	2.32			948,100	4.26		2.31
948,450	4.28	2.32			948,450	4.26		2.31
948,800	4.28	2.32			948,800	4.26		2.31
949,150	4.28	2.32			949,150	4.26		2.31
949,500	4.28	2.32			949,500	4.26		2.31
949,850	4.28	2.32			949,850	4.26		2.31
950,200	4.28	2.32			950,200	4.26		2.31
950,550	4.28	2.32			950,550	4.26		2.31
950,900	4.28	2.32			950,900	4.26		2.31
951,250	4.28	2.32			951,250	4.26		2.31
951,600	4.28	2.32			951,600	4.26		2.31
951,950	4.28	2.32			951,950	4.26		2.31

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
952,300	4.28	2.32			952,300	4.26		2.31
952,650	4.28	2.32			952,650	4.26		2.31
953,000	4.28	2.32			953,000	4.26		2.32
953,350	4.28	2.32			953,350	4.26		2.32
953,700	4.28	2.32			953,700	4.26		2.32
954,050	4.28	2.32			954,050	4.26		2.32
954,400	4.28	2.32			954,400	4.26		2.32
954,750	4.28	2.32			954,750	4.26		2.32
955,100	4.28	2.32			955,100	4.26		2.32
955,450	4.28	2.33			955,450	4.26		2.32
955,800	4.28	2.33			955,800	4.26		2.32
956,150	4.28	2.33			956,150	4.26		2.32
956,500	4.28	2.33			956,500	4.26		2.32
956,850	4.28	2.33			956,850	4.26		2.32
957,200	4.28	2.33			957,200	4.26		2.32
957,550	4.28	2.33			957,550	4.26		2.32
957,900	4.28	2.33			957,900	4.26		2.32
958,250	4.28	2.33			958,250	4.26		2.32
958,600	4.28	2.33			958,600	4.26		2.32
958,950	4.28	2.33			958,950	4.26		2.32
959,300	4.28	2.33			959,300	4.27		2.32
959,650	4.28	2.33			959,650	4.27		2.32
960,000	4.28	2.33			960,000	4.27		2.32
960,350	4.28	2.33			960,350	4.27		2.32
960,700	4.28	2.33			960,700	4.27		2.32
961,050	4.29	2.33			961,050	4.27		2.32
961,400	4.29	2.33			961,400	4.27		2.32
961,750	4.29	2.33			961,750	4.27		2.32
962,100	4.29	2.33			962,100	4.27		2.32
962,450	4.29	2.33			962,450	4.27		2.32
962,800	4.29	2.33			962,800	4.27		2.32
963,150	4.29	2.33			963,150	4.27		2.33
963,500	4.29	2.33			963,500	4.27		2.33
963,850	4.29	2.33			963,850	4.27		2.33
964,200	4.29	2.33			964,200	4.27		2.33
964,550	4.29	2.34			964,550	4.27		2.33
964,900	4.29	2.34			964,900	4.27		2.33
965,250	4.29	2.34			965,250	4.27		2.33
965,600	4.29	2.34			965,600	4.27		2.33
965,950	4.29	2.34			965,950	4.27		2.33
966,300	4.29	2.34			966,300	4.27		2.33
966,650	4.29	2.34			966,650	4.28		2.33
967,000	4.29	2.34			967,000	4.28		2.33
967,350	4.29	2.34			967,350	4.28		2.33
967,700	4.30	2.34			967,700	4.28		2.33
968,050	4.30	2.34			968,050	4.28		2.33
968,400	4.30	2.34			968,400	4.28		2.33
968,750	4.30	2.34			968,750	4.28		2.33
969,100	4.30	2.34			969,100	4.28		2.33
969,450	4.30	2.34			969,450	4.28		2.33
969,800	4.30	2.34			969,800	4.28		2.33

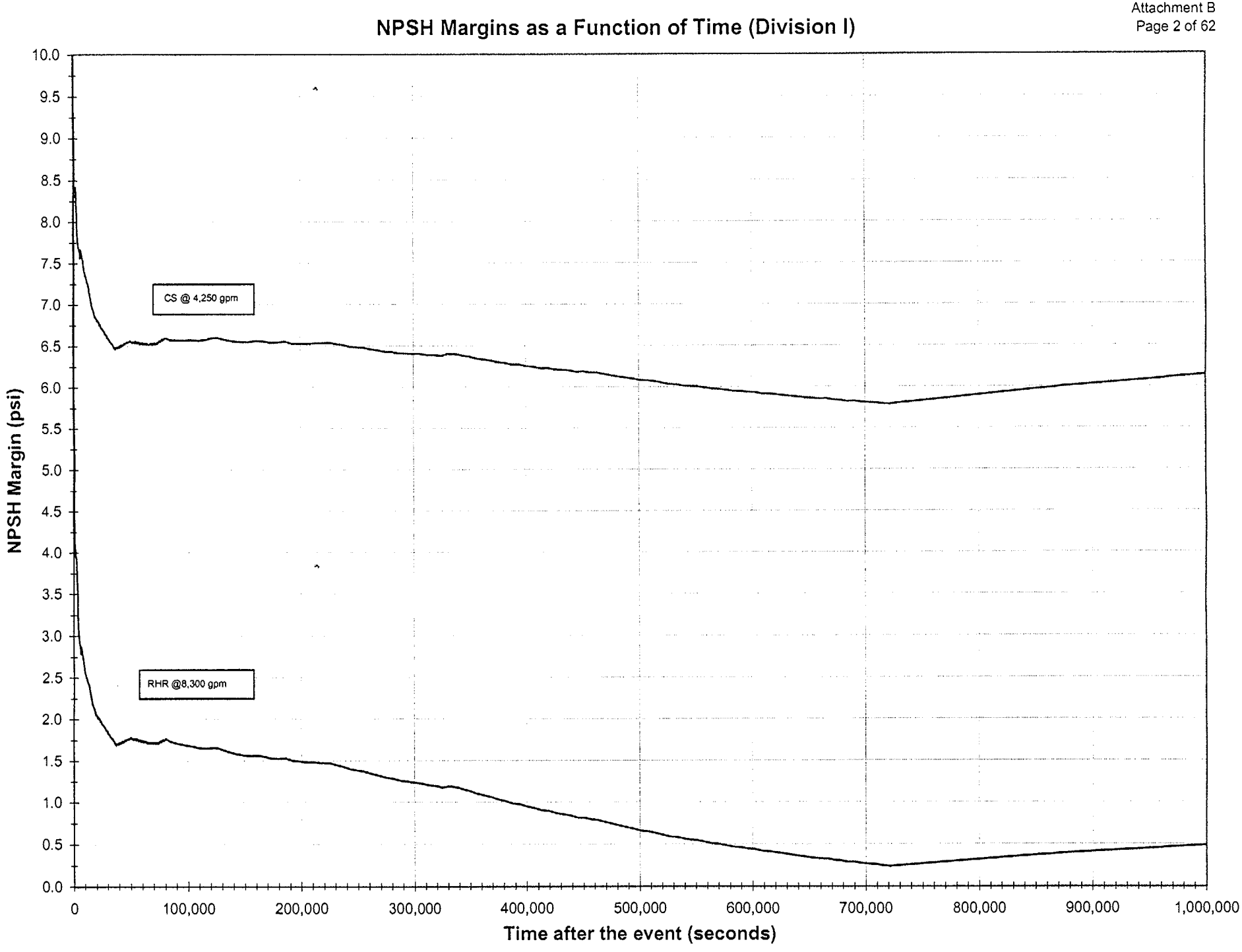
Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
970,150	4.30	2.34			970,150	4.28		2.33
970,500	4.30	2.34			970,500	4.28		2.34
970,850	4.30	2.34			970,850	4.28		2.34
971,200	4.30	2.34			971,200	4.28		2.34
971,550	4.30	2.34			971,550	4.28		2.34
971,900	4.30	2.34			971,900	4.28		2.34
972,250	4.30	2.34			972,250	4.28		2.34
972,600	4.30	2.34			972,600	4.28		2.34
972,950	4.30	2.34			972,950	4.28		2.34
973,300	4.30	2.35			973,300	4.28		2.34
973,650	4.30	2.35			973,650	4.28		2.34
974,000	4.30	2.35			974,000	4.28		2.34
974,350	4.30	2.35			974,350	4.28		2.34
974,700	4.30	2.35			974,700	4.28		2.34
975,050	4.30	2.35			975,050	4.28		2.34
975,400	4.30	2.35			975,400	4.28		2.34
975,750	4.30	2.35			975,750	4.28		2.34
976,100	4.30	2.35			976,100	4.28		2.34
976,450	4.30	2.35			976,450	4.28		2.34
976,800	4.30	2.35			976,800	4.28		2.34
977,150	4.30	2.35			977,150	4.28		2.34
977,500	4.30	2.35			977,500	4.28		2.34
977,850	4.30	2.35			977,850	4.28		2.34
978,200	4.30	2.35			978,200	4.29		2.34
978,550	4.30	2.35			978,550	4.29		2.34
978,900	4.30	2.35			978,900	4.29		2.34
979,250	4.30	2.35			979,250	4.29		2.34
979,600	4.30	2.35			979,600	4.29		2.34
979,950	4.31	2.35			979,950	4.29		2.34
980,300	4.31	2.35			980,300	4.29		2.34
980,650	4.31	2.35			980,650	4.29		2.34
981,000	4.31	2.35			981,000	4.29		2.34
981,350	4.31	2.35			981,350	4.29		2.34
981,700	4.31	2.35			981,700	4.29		2.34
982,050	4.31	2.35			982,050	4.29		2.34
982,400	4.31	2.35			982,400	4.29		2.35
982,750	4.31	2.35			982,750	4.29		2.35
983,100	4.31	2.35			983,100	4.29		2.35
983,450	4.31	2.35			983,450	4.29		2.35
983,800	4.31	2.35			983,800	4.29		2.35
984,150	4.31	2.35			984,150	4.29		2.35
984,500	4.31	2.35			984,500	4.29		2.35
984,850	4.31	2.35			984,850	4.29		2.35
985,200	4.31	2.36			985,200	4.29		2.35
985,550	4.31	2.36			985,550	4.29		2.35
985,900	4.31	2.36			985,900	4.29		2.35
986,250	4.31	2.36			986,250	4.29		2.35
986,600	4.31	2.36			986,600	4.29		2.35
986,950	4.31	2.36			986,950	4.29		2.35
987,300	4.31	2.36			987,300	4.29		2.35
987,650	4.31	2.36			987,650	4.29		2.35

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
988,000	4.31	2.36			988,000	4.29		2.35
988,350	4.31	2.36			988,350	4.29		2.35
988,700	4.31	2.36			988,700	4.29		2.35
989,050	4.31	2.36			989,050	4.29		2.35
989,400	4.31	2.36			989,400	4.29		2.35
989,750	4.31	2.36			989,750	4.29		2.35
990,100	4.31	2.36			990,100	4.29		2.35
990,450	4.31	2.36			990,450	4.29		2.35
990,800	4.31	2.36			990,800	4.30		2.35
991,150	4.31	2.36			991,150	4.30		2.35
991,500	4.31	2.36			991,500	4.30		2.35
991,850	4.31	2.36			991,850	4.30		2.35
992,200	4.31	2.36			992,200	4.30		2.35
992,550	4.32	2.36			992,550	4.30		2.35
992,900	4.32	2.36			992,900	4.30		2.35
993,250	4.32	2.36			993,250	4.30		2.35
993,600	4.32	2.36			993,600	4.30		2.35
993,950	4.32	2.36			993,950	4.30		2.35
994,300	4.32	2.36			994,300	4.30		2.36
994,650	4.32	2.36			994,650	4.30		2.36
995,000	4.32	2.36			995,000	4.30		2.36
995,350	4.32	2.36			995,350	4.30		2.36
995,700	4.32	2.36			995,700	4.30		2.36
996,050	4.32	2.36			996,050	4.30		2.36
996,400	4.32	2.36			996,400	4.30		2.36
996,750	4.32	2.36			996,750	4.30		2.36
997,100	4.32	2.37			997,100	4.30		2.36
997,450	4.32	2.37			997,450	4.30		2.36
997,800	4.32	2.37			997,800	4.30		2.36
998,150	4.32	2.37			998,150	4.30		2.36
998,500	4.32	2.37			998,500	4.30		2.36
998,850	4.32	2.37			998,850	4.30		2.36
999,200	4.32	2.37			999,200	4.30		2.36
999,550	4.32	2.37			999,550	4.30		2.36
999,900	4.32	2.37			999,900	4.30		2.36
Min ->	1.94	0.62			Min ->	1.91		0.61

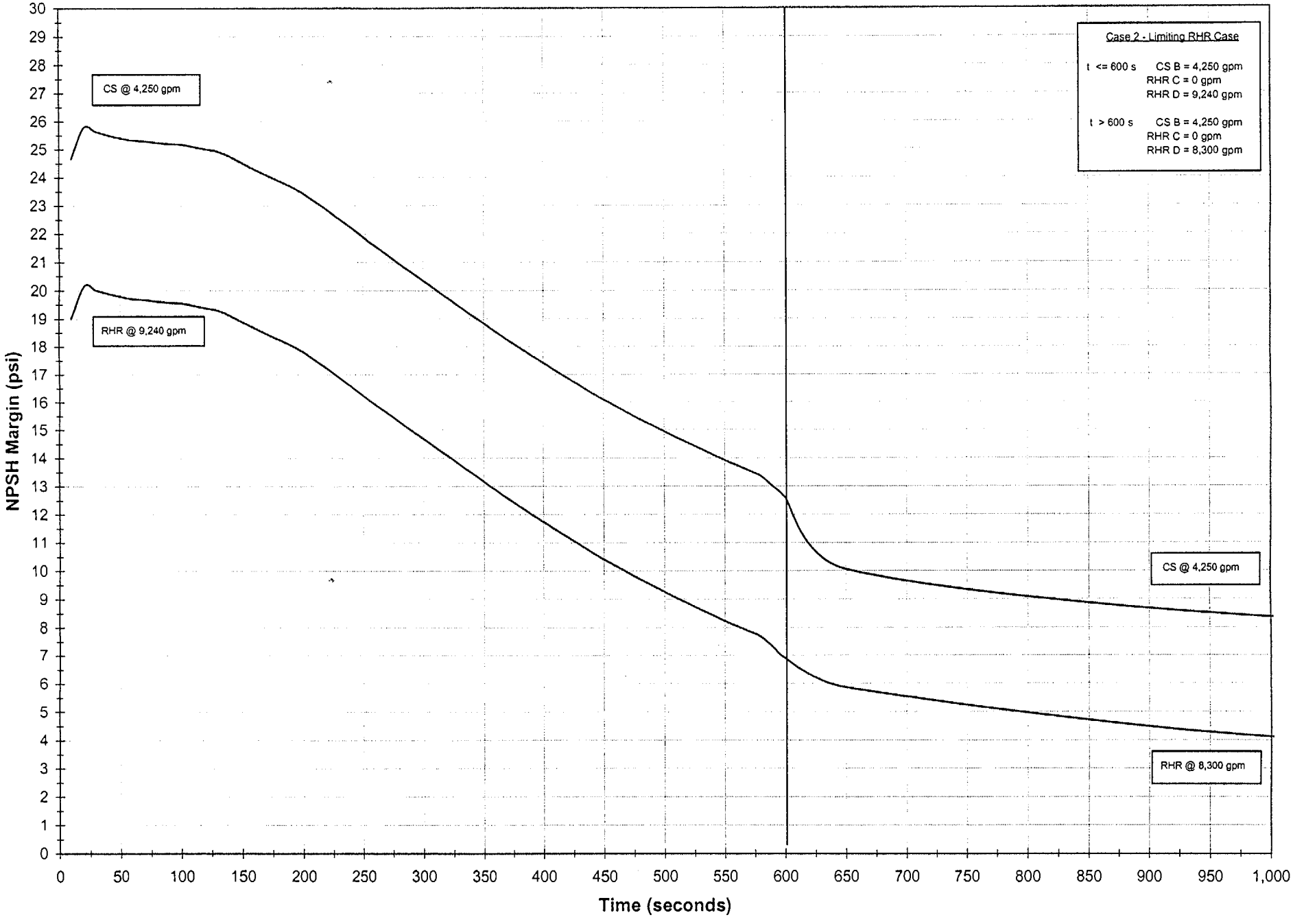
NPSH Margins as a Function of Time (Division I)

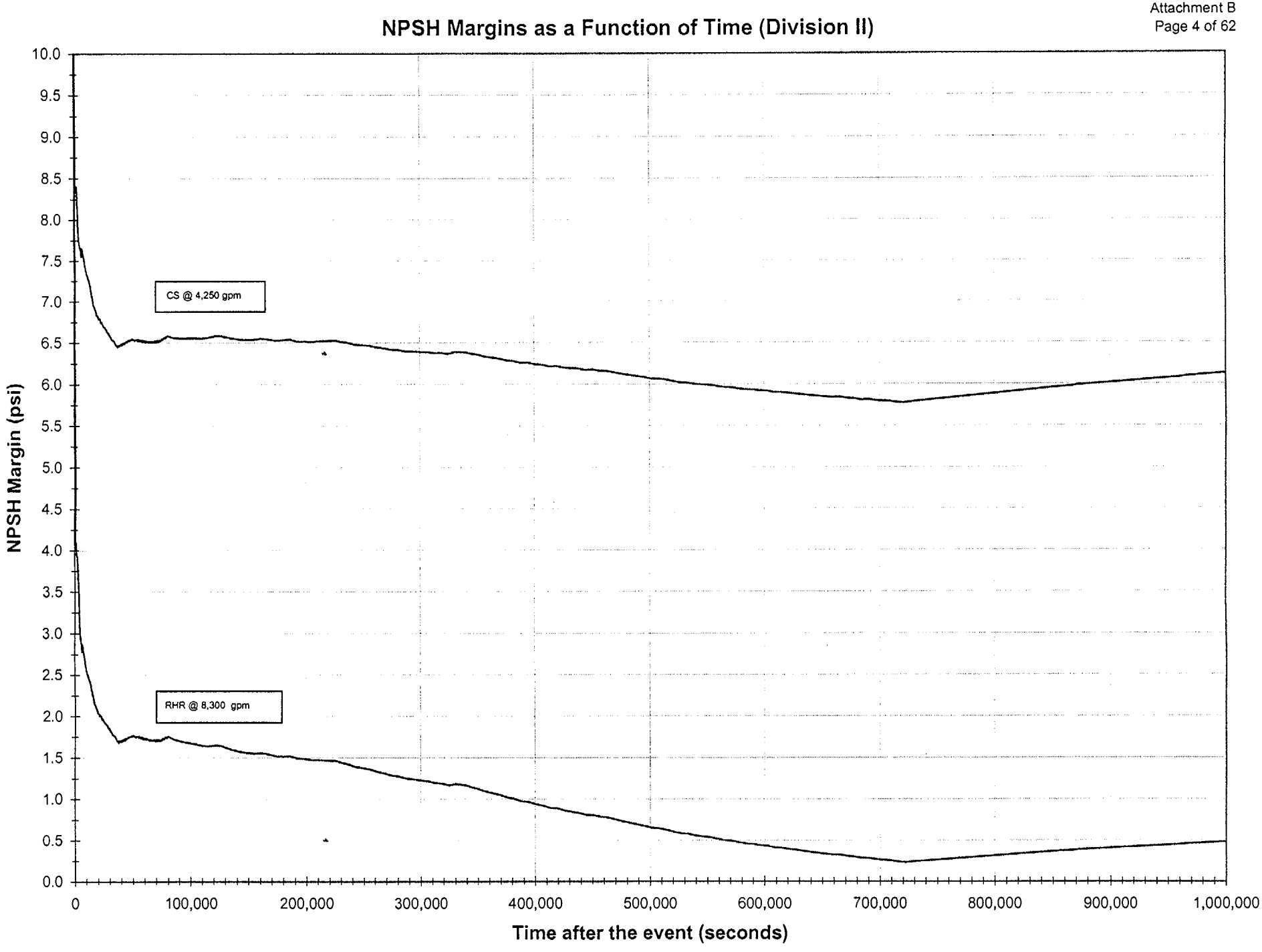


All pages of Attachment B checked
RL 6/15/01


NPSH Margins as a Function of Time (Division I)
NPSH Margin (psi)
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
CS @ 4,250 gpm
RHR @8,300 gpm
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000
800,000
900,000
1,000,000
Time after the event (seconds)

NPSH Margins as a Function of Time (Division II)




NPSH Margins as a Function of Time (Division II)
NPSH Margin (psi)
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
CS @ 4,250 gpm
RHR @ 8,300 gpm
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000
800,000
900,000
1,000,000
Time after the event (seconds)

Case ->	**2**							
			Run profiles Used					
		T<=	*T>*					
Division I		600	600	*Terminating at ->*		1,000,000	*Seconds*	
CS pump A ->		4,250	4,250	*Gpm*				
RHR pump A ->		9,240	8,300	*Gpm*				
RHR pump B ->		0	0	*Gpm*				
					Amount of Fibrous Material			
Division II						75.3	*Lbm*	
CS pump B ->		4,250	4,250	*Gpm*				
RHR pump C ->		0	0	*Gpm*				
RHR pump D ->		9,240	8,300	*Gpm*				
Interpolation routine using Suppression Pool temperature/pressure data in 97044G.xls								
time (sec) ->			999,900					
Pool Temp (°F) ->			147.5					
Chamber Pressure (psia) ->			14.2	*(Constant La =0.635%/day assumed)*				
				Base pressure used ->			14.2	*psia*
			Calculated Margins as a Function of Time (psi)					
	Division I					**Division II**		
	CS	**RHR**				**CS**	**RHR**	
Time (sec)	**Pump A**	**Pump A**	**Pump B**		**Time (sec)**	**Pump B**	**Pump C**	**Pump D**
10	24.67	19.02			***10***	24.66		19.01
20	25.80	20.17			***20***	25.79		20.16
30	25.64	20.02			***30***	25.63		20.00
40	25.52	19.89			***40***	25.50		19.88
50	25.42	19.80			***50***	25.40		19.78
60	25.34	19.71			***60***	25.32		19.70
70	25.31	19.68			***70***	25.29		19.67
80	25.25	19.63			***80***	25.24		19.61
90	25.21	19.59			***90***	25.20		19.57
100	25.19	19.56			***100***	25.17		19.55
110	25.10	19.48			***110***	25.09		19.47
120	25.02	19.39			***120***	25.01		19.38
130	24.94	19.31			***130***	24.92		19.30
140	24.76	19.13			***140***	24.74		19.12
150	24.53	18.90			***150***	24.52		18.89
160	24.31	18.67			***160***	24.29		18.66
170	24.10	18.46			***170***	24.08		18.45
180	23.90	18.26			***180***	23.88		18.25
190	23.70	18.06			***190***	23.68		18.05
200	23.46	17.82			***200***	23.44		17.81
210	23.16	17.52			***210***	23.15		17.51
220	22.86	17.22			***220***	22.85		17.21
230	22.56	16.91			***230***	22.54		16.90
240	22.23	16.59			***240***	22.22		16.58
250	21.91	16.26			***250***	21.89		16.25

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
260	21.59	15.94			***260***	21.57		15.93
270	21.28	15.63			***270***	21.26		15.61
280	20.97	15.31			***280***	20.95		15.30
290	20.66	15.00			***290***	20.64		14.99
300	20.36	14.70			***300***	20.34		14.69
310	20.05	14.40			***310***	20.04		14.38
320	19.75	14.09			***320***	19.74		14.08
330	19.45	13.79			***330***	19.43		13.78
340	19.15	13.48			***340***	19.13		13.47
350	18.85	13.18			***350***	18.83		13.17
360	18.55	12.89			***360***	18.54		12.88
370	18.26	12.60			***370***	18.25		12.58
380	17.97	12.30			***380***	17.96		12.29
390	17.70	12.03			***390***	17.68		12.01
400	17.43	11.75			***400***	17.41		11.74
410	17.16	11.48			***410***	17.14		11.47
420	16.89	11.21			***420***	16.87		11.20
430	16.62	10.94			***430***	16.61		10.93
440	16.35	10.67			***440***	16.34		10.66
450	16.10	10.42			***450***	16.08		10.41
460	15.86	10.18			***460***	15.85		10.17
470	15.63	9.94			***470***	15.61		9.93
480	15.39	9.71			***480***	15.38		9.70
490	15.17	9.49			***490***	15.16		9.48
500	14.96	9.27			***500***	14.94		9.26
510	14.74	9.05			***510***	14.72		9.04
520	14.53	8.84			***520***	14.52		8.83
530	14.33	8.64			***530***	14.32		8.63
540	14.13	8.44			***540***	14.12		8.42
550	13.93	8.24			***550***	13.92		8.23
560	13.75	8.05			***560***	13.73		8.04
570	13.56	7.86			***570***	13.55		7.85
580	13.37	7.67			***580***	13.36		7.66
590	13.00	7.30			***590***	12.99		7.29
600	12.61	6.90			***600***	12.59		6.89
650	10.07	5.87			***650***	10.06		5.86
1,000	8.39	4.13			***1,000***	8.37		4.12
1,350	8.42	4.10			***1,350***	8.40		4.09
1,700	8.37	4.00			***1,700***	8.36		3.99
2,050	8.37	3.94			***2,050***	8.35		3.93
2,400	8.41	3.93			***2,400***	8.40		3.93
2,750	8.25	3.73			***2,750***	8.24		3.72
3,100	8.14	3.58			***3,100***	8.13		3.57
3,450	8.05	3.46			***3,450***	8.04		3.45
3,800	7.93	3.30			***3,800***	7.91		3.29
4,150	7.80	3.14			***4,150***	7.78		3.13
4,500	7.74	3.05			***4,500***	7.72		3.04
4,850	7.70	2.99			***4,850***	7.69		2.98
5,200	7.67	2.94			***5,200***	7.66		2.93
5,550	7.65	2.91			***5,550***	7.64		2.90
5,900	7.63	2.86			***5,900***	7.61		2.86

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
6,250	7.56	2.78			***6,250***	7.55		2.78
6,600	7.66	2.87			***6,600***	7.64		2.86
6,950	7.67	2.87			***6,950***	7.65		2.86
7,300	7.65	2.84			***7,300***	7.63		2.83
7,650	7.63	2.81			***7,650***	7.61		2.80
8,000	7.58	2.76			***8,000***	7.57		2.75
8,350	7.56	2.73			***8,350***	7.54		2.72
8,700	7.53	2.71			***8,700***	7.52		2.70
9,050	7.49	2.66			***9,050***	7.48		2.65
9,400	7.45	2.62			***9,400***	7.43		2.61
9,750	7.43	2.60			***9,750***	7.41		2.59
10,100	7.40	2.57			***10,100***	7.39		2.56
10,450	7.38	2.55			***10,450***	7.37		2.54
10,800	7.36	2.53			***10,800***	7.35		2.52
11,150	7.34	2.51			***11,150***	7.32		2.50
11,500	7.33	2.50			***11,500***	7.32		2.49
11,850	7.30	2.47			***11,850***	7.29		2.46
12,200	7.29	2.46			***12,200***	7.28		2.45
12,550	7.27	2.45			***12,550***	7.26		2.44
12,900	7.26	2.44			***12,900***	7.25		2.43
13,250	7.25	2.43			***13,250***	7.23		2.42
13,600	7.22	2.40			***13,600***	7.21		2.40
13,950	7.20	2.38			***13,950***	7.19		2.37
14,300	7.15	2.34			***14,300***	7.14		2.33
14,650	7.14	2.32			***14,650***	7.12		2.31
15,000	7.11	2.29			***15,000***	7.09		2.28
15,350	7.07	2.26			***15,350***	7.06		2.25
15,700	7.06	2.25			***15,700***	7.04		2.24
16,050	7.03	2.22			***16,050***	7.02		2.21
16,400	7.01	2.20			***16,400***	6.99		2.19
16,750	6.97	2.17			***16,750***	6.96		2.16
17,100	6.96	2.16			***17,100***	6.95		2.15
17,450	6.95	2.14			***17,450***	6.93		2.13
17,800	6.94	2.13			***17,800***	6.92		2.13
18,150	6.91	2.11			***18,150***	6.90		2.10
18,500	6.91	2.10			***18,500***	6.89		2.10
18,850	6.89	2.09			***18,850***	6.88		2.08
19,200	6.87	2.07			***19,200***	6.85		2.06
19,550	6.84	2.05			***19,550***	6.83		2.04
19,900	6.85	2.05			***19,900***	6.84		2.04
20,250	6.84	2.04			***20,250***	6.82		2.03
20,600	6.83	2.04			***20,600***	6.82		2.03
20,950	6.80	2.01			***20,950***	6.79		2.00
21,300	6.80	2.01			***21,300***	6.79		2.00
21,650	6.81	2.02			***21,650***	6.80		2.01
22,000	6.81	2.02			***22,000***	6.79		2.01
22,350	6.79	2.00			***22,350***	6.78		2.00
22,700	6.80	2.01			***22,700***	6.78		2.00
23,050	6.76	1.97			***23,050***	6.75		1.97
23,400	6.75	1.97			***23,400***	6.74		1.96
23,750	6.77	1.98			***23,750***	6.75		1.97

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
24,100	6.75	1.97			***24,100***	6.74		1.96
24,450	6.74	1.96			***24,450***	6.73		1.95
24,800	6.73	1.94			***24,800***	6.71		1.93
25,150	6.72	1.93			***25,150***	6.70		1.93
25,500	6.72	1.93			***25,500***	6.70		1.92
25,850	6.71	1.93			***25,850***	6.69		1.92
26,200	6.70	1.92			***26,200***	6.68		1.91
26,550	6.70	1.92			***26,550***	6.69		1.91
26,900	6.69	1.91			***26,900***	6.68		1.90
27,250	6.68	1.90			***27,250***	6.66		1.89
27,600	6.68	1.90			***27,600***	6.66		1.89
27,950	6.67	1.90			***27,950***	6.66		1.89
28,300	6.64	1.87			***28,300***	6.63		1.86
28,650	6.65	1.87			***28,650***	6.63		1.86
29,000	6.64	1.87			***29,000***	6.63		1.86
29,350	6.64	1.86			***29,350***	6.63		1.85
29,700	6.62	1.84			***29,700***	6.60		1.83
30,050	6.63	1.86			***30,050***	6.62		1.85
30,400	6.60	1.83			***30,400***	6.59		1.82
30,750	6.60	1.83			***30,750***	6.59		1.82
31,100	6.60	1.83			***31,100***	6.59		1.82
31,450	6.59	1.81			***31,450***	6.57		1.80
31,800	6.58	1.81			***31,800***	6.57		1.80
32,150	6.58	1.80			***32,150***	6.56		1.80
32,500	6.56	1.78			***32,500***	6.54		1.77
32,850	6.56	1.78			***32,850***	6.54		1.77
33,200	6.55	1.78			***33,200***	6.54		1.77
33,550	6.55	1.78			***33,550***	6.54		1.77
33,900	6.54	1.77			***33,900***	6.53		1.76
34,250	6.54	1.76			***34,250***	6.52		1.76
34,600	6.54	1.76			***34,600***	6.52		1.75
34,950	6.52	1.74			***34,950***	6.50		1.74
35,300	6.52	1.74			***35,300***	6.50		1.74
35,650	6.51	1.74			***35,650***	6.49		1.73
36,000	6.50	1.72			***36,000***	6.48		1.72
36,350	6.49	1.72			***36,350***	6.48		1.71
36,700	6.48	1.70			***36,700***	6.46		1.70
37,050	6.48	1.71			***37,050***	6.47		1.70
37,400	6.47	1.70			***37,400***	6.46		1.69
37,750	6.46	1.69			***37,750***	6.45		1.68
38,100	6.47	1.70			***38,100***	6.46		1.69
38,450	6.48	1.71			***38,450***	6.47		1.70
38,800	6.48	1.70			***38,800***	6.46		1.69
39,150	6.48	1.70			***39,150***	6.47		1.70
39,500	6.49	1.71			***39,500***	6.47		1.70
39,850	6.48	1.70			***39,850***	6.46		1.69
40,200	6.49	1.72			***40,200***	6.48		1.71
40,550	6.48	1.70			***40,550***	6.47		1.70
40,900	6.49	1.72			***40,900***	6.48		1.71
41,250	6.49	1.72			***41,250***	6.48		1.71
41,600	6.49	1.71			***41,600***	6.47		1.70

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
41,950	6.51	1.73			***41,950***	6.49		1.72
42,300	6.49	1.72			***42,300***	6.48		1.71
42,650	6.51	1.74			***42,650***	6.50		1.73
43,000	6.51	1.73			***43,000***	6.50		1.72
43,350	6.52	1.74			***43,350***	6.50		1.73
43,700	6.50	1.72			***43,700***	6.49		1.71
44,050	6.51	1.73			***44,050***	6.50		1.72
44,400	6.52	1.74			***44,400***	6.50		1.73
44,750	6.52	1.74			***44,750***	6.50		1.73
45,100	6.53	1.74			***45,100***	6.51		1.74
45,450	6.52	1.74			***45,450***	6.51		1.73
45,800	6.54	1.75			***45,800***	6.52		1.75
46,150	6.53	1.74			***46,150***	6.51		1.73
46,500	6.54	1.76			***46,500***	6.52		1.75
46,850	6.54	1.75			***46,850***	6.52		1.74
47,200	6.54	1.76			***47,200***	6.53		1.75
47,550	6.55	1.76			***47,550***	6.53		1.75
47,900	6.54	1.76			***47,900***	6.53		1.75
48,250	6.55	1.76			***48,250***	6.53		1.75
48,600	6.55	1.77			***48,600***	6.54		1.76
48,950	6.55	1.76			***48,950***	6.53		1.75
49,300	6.56	1.77			***49,300***	6.54		1.76
49,650	6.56	1.77			***49,650***	6.54		1.76
50,000	6.56	1.77			***50,000***	6.54		1.76
50,350	6.57	1.78			***50,350***	6.55		1.77
50,700	6.56	1.77			***50,700***	6.55		1.76
51,050	6.56	1.77			***51,050***	6.54		1.76
51,400	6.55	1.76			***51,400***	6.54		1.75
51,750	6.55	1.77			***51,750***	6.54		1.76
52,100	6.55	1.76			***52,100***	6.53		1.75
52,450	6.54	1.75			***52,450***	6.53		1.74
52,800	6.55	1.76			***52,800***	6.54		1.75
53,150	6.55	1.77			***53,150***	6.54		1.76
53,500	6.55	1.76			***53,500***	6.54		1.75
53,850	6.55	1.76			***53,850***	6.54		1.75
54,200	6.55	1.76			***54,200***	6.54		1.75
54,550	6.55	1.76			***54,550***	6.53		1.75
54,900	6.54	1.75			***54,900***	6.53		1.74
55,250	6.56	1.77			***55,250***	6.54		1.76
55,600	6.54	1.75			***55,600***	6.53		1.74
55,950	6.55	1.75			***55,950***	6.53		1.74
56,300	6.54	1.75			***56,300***	6.53		1.74
56,650	6.55	1.76			***56,650***	6.54		1.75
57,000	6.53	1.74			***57,000***	6.52		1.73
57,350	6.54	1.75			***57,350***	6.53		1.74
57,700	6.55	1.75			***57,700***	6.53		1.75
58,050	6.54	1.74			***58,050***	6.52		1.73
58,400	6.55	1.75			***58,400***	6.54		1.74
58,750	6.53	1.73			***58,750***	6.51		1.72
59,100	6.54	1.74			***59,100***	6.52		1.73
59,450	6.54	1.75			***59,450***	6.53		1.74

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
59,800	6.53	1.73			59,800	6.51		1.72
60,150	6.54	1.74			60,150	6.53		1.73
60,500	6.53	1.73			60,500	6.52		1.72
60,850	6.54	1.74			60,850	6.52		1.73
61,200	6.54	1.74			61,200	6.53		1.73
61,550	6.52	1.72			61,550	6.51		1.71
61,900	6.53	1.73			61,900	6.52		1.72
62,250	6.54	1.74			62,250	6.53		1.73
62,600	6.53	1.73			62,600	6.51		1.72
62,950	6.53	1.73			62,950	6.52		1.72
63,300	6.53	1.73			63,300	6.52		1.72
63,650	6.53	1.73			63,650	6.52		1.72
64,000	6.52	1.72			64,000	6.51		1.71
64,350	6.53	1.73			64,350	6.52		1.72
64,700	6.53	1.73			64,700	6.52		1.72
65,050	6.52	1.71			65,050	6.51		1.71
65,400	6.53	1.72			65,400	6.52		1.72
65,750	6.53	1.72			65,750	6.51		1.71
66,100	6.52	1.71			66,100	6.51		1.71
66,450	6.52	1.71			66,450	6.51		1.71
66,800	6.53	1.72			66,800	6.51		1.71
67,150	6.52	1.71			67,150	6.51		1.70
67,500	6.52	1.71			67,500	6.50		1.70
67,850	6.53	1.72			67,850	6.51		1.71
68,200	6.53	1.72			68,200	6.52		1.71
68,550	6.53	1.72			68,550	6.52		1.71
68,900	6.53	1.71			68,900	6.51		1.71
69,250	6.52	1.71			69,250	6.51		1.70
69,600	6.53	1.72			69,600	6.52		1.71
69,950	6.52	1.71			69,950	6.50		1.70
70,300	6.54	1.72			70,300	6.52		1.72
70,650	6.53	1.72			70,650	6.52		1.71
71,000	6.53	1.71			71,000	6.51		1.70
71,350	6.54	1.72			71,350	6.52		1.71
71,700	6.52	1.71			71,700	6.51		1.70
72,050	6.54	1.72			72,050	6.53		1.72
72,400	6.53	1.71			72,400	6.51		1.70
72,750	6.53	1.72			72,750	6.52		1.71
73,100	6.53	1.71			73,100	6.52		1.71
73,450	6.53	1.71			73,450	6.51		1.70
73,800	6.54	1.72			73,800	6.53		1.71
74,150	6.53	1.71			74,150	6.52		1.70
74,500	6.54	1.72			74,500	6.53		1.71
74,850	6.54	1.72			74,850	6.53		1.71
75,200	6.55	1.73			75,200	6.54		1.72
75,550	6.55	1.72			75,550	6.53		1.72
75,900	6.57	1.74			75,900	6.55		1.73
76,250	6.56	1.73			76,250	6.54		1.72
76,600	6.55	1.73			76,600	6.54		1.72
76,950	6.57	1.74			76,950	6.55		1.73
77,300	6.57	1.74			77,300	6.55		1.73

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
77,650	6.58	1.75			77,650	6.56		1.74
78,000	6.58	1.75			78,000	6.56		1.74
78,350	6.59	1.76			78,350	6.57		1.75
78,700	6.57	1.74			78,700	6.56		1.73
79,050	6.58	1.75			79,050	6.57		1.74
79,400	6.58	1.75			79,400	6.56		1.74
79,750	6.58	1.75			79,750	6.57		1.74
80,100	6.59	1.76			80,100	6.58		1.75
80,450	6.60	1.76			80,450	6.58		1.75
80,800	6.60	1.76			80,800	6.58		1.75
81,150	6.60	1.76			81,150	6.58		1.75
81,500	6.59	1.76			81,500	6.58		1.75
81,850	6.59	1.75			81,850	6.58		1.75
82,200	6.59	1.75			82,200	6.58		1.74
82,550	6.59	1.75			82,550	6.58		1.74
82,900	6.59	1.75			82,900	6.57		1.74
83,250	6.59	1.74			83,250	6.57		1.74
83,600	6.58	1.74			83,600	6.57		1.73
83,950	6.58	1.74			83,950	6.57		1.73
84,300	6.58	1.74			84,300	6.57		1.73
84,650	6.58	1.73			84,650	6.56		1.72
85,000	6.58	1.73			85,000	6.56		1.72
85,350	6.58	1.73			85,350	6.56		1.72
85,700	6.58	1.73			85,700	6.56		1.72
86,050	6.58	1.73			86,050	6.56		1.72
86,400	6.58	1.72			86,400	6.56		1.72
86,750	6.58	1.72			86,750	6.56		1.71
87,100	6.58	1.72			87,100	6.56		1.71
87,450	6.57	1.72			87,450	6.56		1.71
87,800	6.57	1.72			87,800	6.56		1.71
88,150	6.57	1.72			88,150	6.56		1.71
88,500	6.57	1.72			88,500	6.56		1.71
88,850	6.57	1.72			88,850	6.56		1.71
89,200	6.57	1.71			89,200	6.56		1.71
89,550	6.57	1.71			89,550	6.56		1.70
89,900	6.57	1.71			89,900	6.56		1.70
90,250	6.57	1.71			90,250	6.56		1.70
90,600	6.57	1.71			90,600	6.56		1.70
90,950	6.57	1.71			90,950	6.56		1.70
91,300	6.57	1.71			91,300	6.56		1.70
91,650	6.57	1.71			91,650	6.56		1.70
92,000	6.57	1.70			92,000	6.56		1.70
92,350	6.57	1.70			92,350	6.56		1.69
92,700	6.57	1.70			92,700	6.56		1.69
93,050	6.57	1.70			93,050	6.56		1.69
93,400	6.57	1.70			93,400	6.56		1.69
93,750	6.57	1.70			93,750	6.56		1.69
94,100	6.57	1.70			94,100	6.56		1.69
94,450	6.57	1.70			94,450	6.56		1.69
94,800	6.57	1.70			94,800	6.56		1.69
95,150	6.57	1.70			95,150	6.56		1.69

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
95,500	6.57	1.69			95,500	6.56		1.69
95,850	6.57	1.69			95,850	6.56		1.69
96,200	6.57	1.69			96,200	6.56		1.68
96,550	6.57	1.69			96,550	6.56		1.68
96,900	6.57	1.69			96,900	6.56		1.68
97,250	6.57	1.69			97,250	6.56		1.68
97,600	6.57	1.69			97,600	6.56		1.68
97,950	6.57	1.69			97,950	6.56		1.68
98,300	6.57	1.69			98,300	6.56		1.68
98,650	6.57	1.69			98,650	6.56		1.68
99,000	6.57	1.69			99,000	6.56		1.68
99,350	6.57	1.68			99,350	6.56		1.68
99,700	6.57	1.68			99,700	6.56		1.68
100,050	6.57	1.68			100,050	6.56		1.67
100,400	6.57	1.68			100,400	6.56		1.67
100,750	6.57	1.68			100,750	6.56		1.67
101,100	6.57	1.68			101,100	6.56		1.67
101,450	6.57	1.68			101,450	6.56		1.67
101,800	6.57	1.68			101,800	6.56		1.67
102,150	6.57	1.68			102,150	6.56		1.67
102,500	6.57	1.68			102,500	6.56		1.67
102,850	6.57	1.68			102,850	6.56		1.67
103,200	6.57	1.68			103,200	6.56		1.67
103,550	6.57	1.68			103,550	6.56		1.67
103,900	6.57	1.67			103,900	6.56		1.67
104,250	6.57	1.67			104,250	6.56		1.66
104,600	6.57	1.67			104,600	6.56		1.66
104,950	6.57	1.67			104,950	6.56		1.66
105,300	6.57	1.67			105,300	6.56		1.66
105,650	6.57	1.67			105,650	6.56		1.66
106,000	6.57	1.67			106,000	6.56		1.66
106,350	6.57	1.67			106,350	6.56		1.66
106,700	6.57	1.66			106,700	6.56		1.66
107,050	6.57	1.66			107,050	6.56		1.66
107,400	6.57	1.66			107,400	6.56		1.65
107,750	6.57	1.66			107,750	6.56		1.65
108,100	6.57	1.66			108,100	6.56		1.65
108,450	6.57	1.66			108,450	6.56		1.65
108,800	6.57	1.66			108,800	6.55		1.65
109,150	6.57	1.66			109,150	6.55		1.65
109,500	6.57	1.66			109,500	6.55		1.65
109,850	6.57	1.65			109,850	6.55		1.65
110,200	6.57	1.65			110,200	6.55		1.64
110,550	6.57	1.65			110,550	6.55		1.64
110,900	6.57	1.65			110,900	6.55		1.64
111,250	6.57	1.65			111,250	6.56		1.64
111,600	6.57	1.65			111,600	6.56		1.64
111,950	6.57	1.65			111,950	6.56		1.64
112,300	6.57	1.65			112,300	6.56		1.64
112,650	6.57	1.65			112,650	6.56		1.64
113,000	6.57	1.65			113,000	6.56		1.64

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
113,350	6.57	1.65			***113,350***	6.56		1.64
113,700	6.57	1.65			***113,700***	6.56		1.64
114,050	6.57	1.65			***114,050***	6.56		1.64
114,400	6.57	1.65			***114,400***	6.56		1.64
114,750	6.58	1.65			***114,750***	6.56		1.64
115,100	6.58	1.65			***115,100***	6.56		1.64
115,450	6.58	1.65			***115,450***	6.56		1.64
115,800	6.58	1.65			***115,800***	6.56		1.64
116,150	6.58	1.65			***116,150***	6.56		1.64
116,500	6.58	1.65			***116,500***	6.56		1.64
116,850	6.58	1.65			***116,850***	6.56		1.64
117,200	6.58	1.65			***117,200***	6.57		1.64
117,550	6.58	1.65			***117,550***	6.57		1.64
117,900	6.58	1.65			***117,900***	6.57		1.64
118,250	6.58	1.65			***118,250***	6.57		1.64
118,600	6.59	1.65			***118,600***	6.57		1.64
118,950	6.59	1.65			***118,950***	6.57		1.64
119,300	6.59	1.65			***119,300***	6.57		1.64
119,650	6.59	1.65			***119,650***	6.57		1.64
120,000	6.59	1.65			***120,000***	6.58		1.65
120,350	6.59	1.65			***120,350***	6.58		1.65
120,700	6.59	1.66			***120,700***	6.58		1.65
121,050	6.59	1.66			***121,050***	6.58		1.65
121,400	6.60	1.66			***121,400***	6.58		1.65
121,750	6.60	1.66			***121,750***	6.58		1.65
122,100	6.60	1.66			***122,100***	6.58		1.65
122,450	6.60	1.66			***122,450***	6.58		1.65
122,800	6.60	1.66			***122,800***	6.59		1.65
123,150	6.60	1.66			***123,150***	6.59		1.65
123,500	6.60	1.66			***123,500***	6.59		1.65
123,850	6.60	1.66			***123,850***	6.59		1.65
124,200	6.60	1.66			***124,200***	6.59		1.65
124,550	6.60	1.65			***124,550***	6.58		1.65
124,900	6.60	1.65			***124,900***	6.58		1.65
125,250	6.60	1.65			***125,250***	6.58		1.64
125,600	6.60	1.65			***125,600***	6.58		1.64
125,950	6.60	1.65			***125,950***	6.58		1.64
126,300	6.60	1.65			***126,300***	6.58		1.64
126,650	6.60	1.65			***126,650***	6.58		1.64
127,000	6.60	1.65			***127,000***	6.58		1.64
127,350	6.60	1.65			***127,350***	6.58		1.64
127,700	6.60	1.65			***127,700***	6.58		1.64
128,050	6.60	1.65			***128,050***	6.58		1.64
128,400	6.60	1.64			***128,400***	6.58		1.63
128,750	6.59	1.64			***128,750***	6.58		1.63
129,100	6.59	1.64			***129,100***	6.58		1.63
129,450	6.59	1.64			***129,450***	6.58		1.63
129,800	6.59	1.64			***129,800***	6.57		1.63
130,150	6.59	1.63			***130,150***	6.57		1.62
130,500	6.59	1.63			***130,500***	6.57		1.62
130,850	6.59	1.63			***130,850***	6.57		1.62

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
131,200	6.58	1.63			131,200	6.57		1.62
131,550	6.58	1.63			131,550	6.57		1.62
131,900	6.58	1.63			131,900	6.57		1.62
132,250	6.58	1.62			132,250	6.57		1.61
132,600	6.58	1.62			132,600	6.57		1.61
132,950	6.58	1.62			132,950	6.56		1.61
133,300	6.58	1.62			133,300	6.56		1.61
133,650	6.58	1.62			133,650	6.56		1.61
134,000	6.58	1.62			134,000	6.56		1.61
134,350	6.58	1.61			134,350	6.56		1.61
134,700	6.57	1.61			134,700	6.56		1.60
135,050	6.57	1.61			135,050	6.56		1.60
135,400	6.57	1.61			135,400	6.56		1.60
135,750	6.57	1.61			135,750	6.56		1.60
136,100	6.57	1.61			136,100	6.56		1.60
136,450	6.57	1.60			136,450	6.55		1.60
136,800	6.57	1.60			136,800	6.55		1.59
137,150	6.57	1.60			137,150	6.55		1.59
137,500	6.57	1.60			137,500	6.55		1.59
137,850	6.57	1.60			137,850	6.55		1.59
138,200	6.57	1.60			138,200	6.55		1.59
138,550	6.56	1.60			138,550	6.55		1.59
138,900	6.56	1.60			138,900	6.55		1.59
139,250	6.56	1.59			139,250	6.55		1.59
139,600	6.56	1.59			139,600	6.55		1.58
139,950	6.56	1.59			139,950	6.55		1.58
140,300	6.56	1.59			140,300	6.55		1.58
140,650	6.56	1.59			140,650	6.54		1.58
141,000	6.56	1.59			141,000	6.54		1.58
141,350	6.56	1.59			141,350	6.54		1.58
141,700	6.56	1.58			141,700	6.54		1.58
142,050	6.56	1.58			142,050	6.54		1.57
142,400	6.56	1.58			142,400	6.54		1.57
142,750	6.56	1.58			142,750	6.54		1.57
143,100	6.56	1.58			143,100	6.54		1.57
143,450	6.56	1.58			143,450	6.54		1.57
143,800	6.55	1.58			143,800	6.54		1.57
144,150	6.55	1.58			144,150	6.54		1.57
144,500	6.55	1.58			144,500	6.54		1.57
144,850	6.55	1.58			144,850	6.54		1.57
145,200	6.55	1.58			145,200	6.54		1.57
145,550	6.55	1.58			145,550	6.54		1.57
145,900	6.55	1.57			145,900	6.54		1.57
146,250	6.55	1.57			146,250	6.54		1.56
146,600	6.55	1.57			146,600	6.54		1.56
146,950	6.55	1.57			146,950	6.54		1.56
147,300	6.55	1.57			147,300	6.54		1.56
147,650	6.55	1.57			147,650	6.54		1.56
148,000	6.55	1.57			148,000	6.54		1.56
148,350	6.55	1.57			148,350	6.54		1.56
148,700	6.55	1.57			148,700	6.54		1.56

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
149,050	6.55	1.57			***149,050***	6.54		1.56
149,400	6.55	1.57			***149,400***	6.54		1.56
149,750	6.55	1.57			***149,750***	6.54		1.56
150,100	6.55	1.57			***150,100***	6.54		1.56
150,450	6.55	1.57			***150,450***	6.54		1.56
150,800	6.55	1.57			***150,800***	6.54		1.56
151,150	6.55	1.57			***151,150***	6.54		1.56
151,500	6.55	1.56			***151,500***	6.54		1.56
151,850	6.55	1.56			***151,850***	6.54		1.56
152,200	6.55	1.56			***152,200***	6.54		1.56
152,550	6.55	1.56			***152,550***	6.54		1.55
152,900	6.55	1.56			***152,900***	6.54		1.55
153,250	6.55	1.56			***153,250***	6.54		1.55
153,600	6.55	1.56			***153,600***	6.54		1.55
153,950	6.55	1.56			***153,950***	6.54		1.55
154,300	6.55	1.56			***154,300***	6.54		1.55
154,650	6.55	1.56			***154,650***	6.54		1.55
155,000	6.55	1.56			***155,000***	6.54		1.55
155,350	6.55	1.56			***155,350***	6.54		1.55
155,700	6.55	1.56			***155,700***	6.54		1.55
156,050	6.56	1.56			***156,050***	6.54		1.55
156,400	6.56	1.56			***156,400***	6.54		1.55
156,750	6.56	1.56			***156,750***	6.54		1.55
157,100	6.56	1.56			***157,100***	6.54		1.55
157,450	6.56	1.56			***157,450***	6.54		1.55
157,800	6.56	1.56			***157,800***	6.54		1.55
158,150	6.56	1.56			***158,150***	6.55		1.55
158,500	6.56	1.56			***158,500***	6.55		1.55
158,850	6.56	1.56			***158,850***	6.55		1.56
159,200	6.56	1.56			***159,200***	6.55		1.56
159,550	6.56	1.56			***159,550***	6.55		1.56
159,900	6.56	1.56			***159,900***	6.55		1.56
160,250	6.56	1.56			***160,250***	6.55		1.56
160,600	6.56	1.57			***160,600***	6.55		1.56
160,950	6.56	1.56			***160,950***	6.55		1.56
161,300	6.56	1.56			***161,300***	6.55		1.56
161,650	6.56	1.56			***161,650***	6.55		1.55
162,000	6.56	1.56			***162,000***	6.55		1.55
162,350	6.56	1.56			***162,350***	6.55		1.55
162,700	6.56	1.56			***162,700***	6.55		1.55
163,050	6.56	1.56			***163,050***	6.55		1.55
163,400	6.56	1.56			***163,400***	6.55		1.55
163,750	6.56	1.56			***163,750***	6.55		1.55
164,100	6.56	1.56			***164,100***	6.55		1.55
164,450	6.56	1.56			***164,450***	6.55		1.55
164,800	6.56	1.56			***164,800***	6.55		1.55
165,150	6.56	1.56			***165,150***	6.55		1.55
165,500	6.56	1.55			***165,500***	6.55		1.55
165,850	6.56	1.55			***165,850***	6.55		1.55
166,200	6.56	1.55			***166,200***	6.54		1.54
166,550	6.56	1.55			***166,550***	6.54		1.54

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
166,900	6.56	1.55			166,900	6.54		1.54
167,250	6.56	1.55			167,250	6.54		1.54
167,600	6.56	1.55			167,600	6.54		1.54
167,950	6.56	1.55			167,950	6.54		1.54
168,300	6.56	1.55			168,300	6.54		1.54
168,650	6.55	1.55			168,650	6.54		1.54
169,000	6.55	1.54			169,000	6.54		1.54
169,350	6.55	1.54			169,350	6.54		1.53
169,700	6.55	1.54			169,700	6.54		1.53
170,050	6.55	1.54			170,050	6.54		1.53
170,400	6.55	1.54			170,400	6.54		1.53
170,750	6.55	1.54			170,750	6.53		1.53
171,100	6.55	1.54			171,100	6.53		1.53
171,450	6.55	1.54			171,450	6.53		1.53
171,800	6.55	1.53			171,800	6.53		1.53
172,150	6.55	1.53			172,150	6.53		1.52
172,500	6.54	1.53			172,500	6.53		1.52
172,850	6.54	1.53			172,850	6.53		1.52
173,200	6.54	1.53			173,200	6.53		1.52
173,550	6.54	1.53			173,550	6.53		1.52
173,900	6.54	1.53			173,900	6.53		1.52
174,250	6.54	1.53			174,250	6.53		1.52
174,600	6.54	1.53			174,600	6.53		1.52
174,950	6.54	1.53			174,950	6.53		1.52
175,300	6.54	1.53			175,300	6.53		1.52
175,650	6.54	1.53			175,650	6.53		1.52
176,000	6.54	1.53			176,000	6.53		1.52
176,350	6.54	1.53			176,350	6.53		1.52
176,700	6.54	1.53			176,700	6.53		1.52
177,050	6.54	1.53			177,050	6.53		1.52
177,400	6.55	1.53			177,400	6.53		1.52
177,750	6.55	1.53			177,750	6.53		1.52
178,100	6.55	1.53			178,100	6.53		1.52
178,450	6.55	1.53			178,450	6.53		1.52
178,800	6.55	1.53			178,800	6.53		1.52
179,150	6.55	1.53			179,150	6.53		1.52
179,500	6.55	1.53			179,500	6.53		1.52
179,850	6.55	1.53			179,850	6.53		1.52
180,200	6.55	1.53			180,200	6.53		1.52
180,550	6.55	1.53			180,550	6.53		1.52
180,900	6.55	1.53			180,900	6.53		1.52
181,250	6.55	1.53			181,250	6.53		1.52
181,600	6.55	1.53			181,600	6.53		1.52
181,950	6.55	1.53			181,950	6.54		1.52
182,300	6.55	1.53			182,300	6.54		1.52
182,650	6.55	1.53			182,650	6.54		1.52
183,000	6.55	1.53			183,000	6.54		1.52
183,350	6.55	1.53			183,350	6.54		1.52
183,700	6.55	1.53			183,700	6.54		1.52
184,050	6.55	1.53			184,050	6.54		1.52
184,400	6.55	1.53			184,400	6.54		1.52

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
184,750	6.55	1.53			***184,750***	6.54		1.52
185,100	6.55	1.53			***185,100***	6.54		1.52
185,450	6.56	1.53			***185,450***	6.54		1.52
185,800	6.56	1.53			***185,800***	6.54		1.52
186,150	6.55	1.53			***186,150***	6.54		1.52
186,500	6.55	1.53			***186,500***	6.54		1.52
186,850	6.55	1.53			***186,850***	6.54		1.52
187,200	6.55	1.52			***187,200***	6.54		1.52
187,550	6.55	1.52			***187,550***	6.53		1.51
187,900	6.55	1.52			***187,900***	6.53		1.51
188,250	6.55	1.52			***188,250***	6.53		1.51
188,600	6.54	1.52			***188,600***	6.53		1.51
188,950	6.54	1.52			***188,950***	6.53		1.51
189,300	6.54	1.51			***189,300***	6.53		1.51
189,650	6.54	1.51			***189,650***	6.53		1.50
190,000	6.54	1.51			***190,000***	6.52		1.50
190,350	6.54	1.51			***190,350***	6.52		1.50
190,700	6.54	1.51			***190,700***	6.52		1.50
191,050	6.53	1.51			***191,050***	6.52		1.50
191,400	6.53	1.51			***191,400***	6.52		1.50
191,750	6.53	1.50			***191,750***	6.52		1.49
192,100	6.53	1.50			***192,100***	6.52		1.49
192,450	6.53	1.50			***192,450***	6.52		1.49
192,800	6.53	1.50			***192,800***	6.52		1.49
193,150	6.53	1.50			***193,150***	6.52		1.49
193,500	6.53	1.50			***193,500***	6.52		1.49
193,850	6.53	1.50			***193,850***	6.52		1.49
194,200	6.53	1.50			***194,200***	6.52		1.49
194,550	6.53	1.50			***194,550***	6.52		1.49
194,900	6.53	1.50			***194,900***	6.52		1.49
195,250	6.53	1.50			***195,250***	6.52		1.49
195,600	6.53	1.50			***195,600***	6.52		1.49
195,950	6.53	1.50			***195,950***	6.52		1.49
196,300	6.53	1.50			***196,300***	6.52		1.49
196,650	6.53	1.50			***196,650***	6.52		1.49
197,000	6.53	1.50			***197,000***	6.52		1.49
197,350	6.53	1.50			***197,350***	6.52		1.49
197,700	6.53	1.50			***197,700***	6.52		1.49
198,050	6.53	1.50			***198,050***	6.52		1.49
198,400	6.53	1.49			***198,400***	6.52		1.49
198,750	6.53	1.49			***198,750***	6.52		1.49
199,100	6.53	1.49			***199,100***	6.52		1.48
199,450	6.53	1.49			***199,450***	6.52		1.48
199,800	6.53	1.49			***199,800***	6.52		1.48
200,150	6.53	1.49			***200,150***	6.52		1.48
200,500	6.53	1.49			***200,500***	6.52		1.48
200,850	6.53	1.49			***200,850***	6.52		1.48
201,200	6.53	1.49			***201,200***	6.52		1.48
201,550	6.53	1.49			***201,550***	6.51		1.48
201,900	6.53	1.49			***201,900***	6.51		1.48
202,250	6.53	1.49			***202,250***	6.51		1.48

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
202,600	6.53	1.49			202,600	6.51		1.48
202,950	6.53	1.49			202,950	6.51		1.48
203,300	6.53	1.49			203,300	6.51		1.48
203,650	6.53	1.49			203,650	6.51		1.48
204,000	6.53	1.48			204,000	6.51		1.48
204,350	6.53	1.48			204,350	6.51		1.48
204,700	6.53	1.48			204,700	6.51		1.47
205,050	6.53	1.48			205,050	6.51		1.47
205,400	6.53	1.48			205,400	6.51		1.47
205,750	6.53	1.48			205,750	6.51		1.47
206,100	6.53	1.48			206,100	6.51		1.47
206,450	6.53	1.48			206,450	6.51		1.47
206,800	6.53	1.48			206,800	6.51		1.47
207,150	6.53	1.48			207,150	6.52		1.47
207,500	6.53	1.48			207,500	6.52		1.47
207,850	6.53	1.48			207,850	6.52		1.47
208,200	6.53	1.48			208,200	6.52		1.47
208,550	6.53	1.48			208,550	6.52		1.47
208,900	6.53	1.48			208,900	6.52		1.47
209,250	6.53	1.48			209,250	6.52		1.47
209,600	6.53	1.48			209,600	6.52		1.47
209,950	6.53	1.48			209,950	6.52		1.47
210,300	6.53	1.48			210,300	6.52		1.47
210,650	6.53	1.48			210,650	6.52		1.47
211,000	6.53	1.48			211,000	6.52		1.47
211,350	6.53	1.48			211,350	6.52		1.47
211,700	6.53	1.48			211,700	6.52		1.47
212,050	6.53	1.48			212,050	6.52		1.47
212,400	6.53	1.48			212,400	6.52		1.47
212,750	6.53	1.48			212,750	6.52		1.47
213,100	6.53	1.48			213,100	6.52		1.47
213,450	6.53	1.48			213,450	6.52		1.47
213,800	6.54	1.48			213,800	6.52		1.47
214,150	6.54	1.48			214,150	6.52		1.47
214,500	6.54	1.48			214,500	6.52		1.47
214,850	6.54	1.48			214,850	6.52		1.47
215,200	6.54	1.48			215,200	6.52		1.47
215,550	6.54	1.48			215,550	6.52		1.47
215,900	6.54	1.48			215,900	6.52		1.47
216,250	6.54	1.48			216,250	6.52		1.47
216,600	6.54	1.48			216,600	6.52		1.47
216,950	6.54	1.48			216,950	6.52		1.47
217,300	6.54	1.48			217,300	6.52		1.47
217,650	6.54	1.48			217,650	6.52		1.47
218,000	6.54	1.48			218,000	6.52		1.47
218,350	6.54	1.48			218,350	6.52		1.47
218,700	6.54	1.48			218,700	6.52		1.47
219,050	6.54	1.48			219,050	6.52		1.47
219,400	6.54	1.48			219,400	6.52		1.47
219,750	6.54	1.48			219,750	6.52		1.47
220,100	6.54	1.48			220,100	6.52		1.47

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
220,450	6.54	1.48			220,450	6.52		1.47
220,800	6.54	1.48			220,800	6.52		1.47
221,150	6.54	1.48			221,150	6.52		1.47
221,500	6.54	1.48			221,500	6.53		1.47
221,850	6.54	1.47			221,850	6.53		1.47
222,200	6.54	1.47			222,200	6.53		1.47
222,550	6.54	1.47			222,550	6.53		1.47
222,900	6.54	1.47			222,900	6.53		1.47
223,250	6.54	1.47			223,250	6.53		1.47
223,600	6.54	1.47			223,600	6.53		1.47
223,950	6.54	1.47			223,950	6.53		1.47
224,300	6.54	1.47			224,300	6.53		1.46
224,650	6.54	1.47			224,650	6.53		1.46
225,000	6.54	1.47			225,000	6.53		1.46
225,350	6.54	1.47			225,350	6.53		1.46
225,700	6.54	1.47			225,700	6.53		1.46
226,050	6.54	1.47			226,050	6.53		1.46
226,400	6.54	1.47			226,400	6.52		1.46
226,750	6.54	1.47			226,750	6.52		1.46
227,100	6.54	1.47			227,100	6.52		1.46
227,450	6.54	1.46			227,450	6.52		1.46
227,800	6.53	1.46			227,800	6.52		1.45
228,150	6.53	1.46			228,150	6.52		1.45
228,500	6.53	1.46			228,500	6.52		1.45
228,850	6.53	1.46			228,850	6.52		1.45
229,200	6.53	1.46			229,200	6.52		1.45
229,550	6.53	1.45			229,550	6.51		1.45
229,900	6.53	1.45			229,900	6.51		1.44
230,250	6.53	1.45			230,250	6.51		1.44
230,600	6.53	1.45			230,600	6.51		1.44
230,950	6.53	1.45			230,950	6.51		1.44
231,300	6.53	1.45			231,300	6.51		1.44
231,650	6.52	1.45			231,650	6.51		1.44
232,000	6.52	1.45			232,000	6.51		1.44
232,350	6.52	1.44			232,350	6.51		1.44
232,700	6.52	1.44			232,700	6.51		1.43
233,050	6.52	1.44			233,050	6.51		1.43
233,400	6.52	1.44			233,400	6.51		1.43
233,750	6.52	1.44			233,750	6.51		1.43
234,100	6.52	1.44			234,100	6.51		1.43
234,450	6.52	1.44			234,450	6.51		1.43
234,800	6.52	1.44			234,800	6.50		1.43
235,150	6.52	1.44			235,150	6.50		1.43
235,500	6.52	1.43			235,500	6.50		1.43
235,850	6.52	1.43			235,850	6.50		1.42
236,200	6.52	1.43			236,200	6.50		1.42
236,550	6.52	1.43			236,550	6.50		1.42
236,900	6.51	1.43			236,900	6.50		1.42
237,250	6.51	1.43			237,250	6.50		1.42
237,600	6.51	1.43			237,600	6.50		1.42
237,950	6.51	1.42			237,950	6.50		1.42

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
238,300	6.51	1.42			238,300	6.49		1.41
238,650	6.51	1.42			238,650	6.49		1.41
239,000	6.51	1.42			239,000	6.49		1.41
239,350	6.51	1.42			239,350	6.49		1.41
239,700	6.50	1.42			239,700	6.49		1.41
240,050	6.50	1.41			240,050	6.49		1.40
240,400	6.50	1.41			240,400	6.49		1.40
240,750	6.50	1.41			240,750	6.49		1.40
241,100	6.50	1.41			241,100	6.48		1.40
241,450	6.50	1.41			241,450	6.48		1.40
241,800	6.50	1.41			241,800	6.48		1.40
242,150	6.50	1.40			242,150	6.48		1.39
242,500	6.49	1.40			242,500	6.48		1.39
242,850	6.49	1.40			242,850	6.48		1.39
243,200	6.49	1.40			243,200	6.48		1.39
243,550	6.49	1.40			243,550	6.48		1.39
243,900	6.49	1.40			243,900	6.48		1.39
244,250	6.49	1.40			244,250	6.48		1.39
244,600	6.49	1.40			244,600	6.48		1.39
244,950	6.49	1.40			244,950	6.48		1.39
245,300	6.49	1.39			245,300	6.48		1.39
245,650	6.49	1.39			245,650	6.48		1.38
246,000	6.49	1.39			246,000	6.47		1.38
246,350	6.49	1.39			246,350	6.47		1.38
246,700	6.49	1.39			246,700	6.47		1.38
247,050	6.49	1.39			247,050	6.47		1.38
247,400	6.49	1.39			247,400	6.47		1.38
247,750	6.49	1.39			247,750	6.47		1.38
248,100	6.49	1.39			248,100	6.47		1.38
248,450	6.49	1.39			248,450	6.47		1.38
248,800	6.49	1.39			248,800	6.47		1.38
249,150	6.49	1.38			249,150	6.47		1.38
249,500	6.49	1.38			249,500	6.47		1.37
249,850	6.49	1.38			249,850	6.47		1.37
250,200	6.49	1.38			250,200	6.47		1.37
250,550	6.48	1.38			250,550	6.47		1.37
250,900	6.48	1.38			250,900	6.47		1.37
251,250	6.48	1.38			251,250	6.47		1.37
251,600	6.48	1.38			251,600	6.47		1.37
251,950	6.48	1.38			251,950	6.47		1.37
252,300	6.48	1.38			252,300	6.47		1.37
252,650	6.48	1.38			252,650	6.47		1.37
253,000	6.48	1.38			253,000	6.47		1.37
253,350	6.48	1.37			253,350	6.47		1.37
253,700	6.48	1.37			253,700	6.47		1.37
254,050	6.48	1.37			254,050	6.47		1.36
254,400	6.48	1.37			254,400	6.47		1.36
254,750	6.48	1.37			254,750	6.47		1.36
255,100	6.48	1.37			255,100	6.47		1.36
255,450	6.48	1.37			255,450	6.47		1.36
255,800	6.48	1.37			255,800	6.46		1.36

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
256,150	6.48	1.37			256,150	6.46		1.36
256,500	6.48	1.37			256,500	6.46		1.36
256,850	6.48	1.36			256,850	6.46		1.36
257,200	6.48	1.36			257,200	6.46		1.35
257,550	6.47	1.36			257,550	6.46		1.35
257,900	6.47	1.36			257,900	6.46		1.35
258,250	6.47	1.36			258,250	6.46		1.35
258,600	6.47	1.36			258,600	6.46		1.35
258,950	6.47	1.35			258,950	6.46		1.35
259,300	6.47	1.35			259,300	6.45		1.34
259,650	6.47	1.35			259,650	6.45		1.34
260,000	6.47	1.35			260,000	6.45		1.34
260,350	6.47	1.35			260,350	6.45		1.34
260,700	6.46	1.35			260,700	6.45		1.34
261,050	6.46	1.35			261,050	6.45		1.34
261,400	6.46	1.34			261,400	6.45		1.34
261,750	6.46	1.34			261,750	6.45		1.33
262,100	6.46	1.34			262,100	6.45		1.33
262,450	6.46	1.34			262,450	6.45		1.33
262,800	6.46	1.34			262,800	6.44		1.33
263,150	6.46	1.34			263,150	6.44		1.33
263,500	6.46	1.34			263,500	6.44		1.33
263,850	6.46	1.34			263,850	6.44		1.33
264,200	6.46	1.33			264,200	6.44		1.33
264,550	6.46	1.33			264,550	6.44		1.32
264,900	6.46	1.33			264,900	6.44		1.32
265,250	6.45	1.33			265,250	6.44		1.32
265,600	6.45	1.33			265,600	6.44		1.32
265,950	6.45	1.33			265,950	6.44		1.32
266,300	6.45	1.33			266,300	6.44		1.32
266,650	6.45	1.33			266,650	6.44		1.32
267,000	6.45	1.33			267,000	6.44		1.32
267,350	6.45	1.32			267,350	6.44		1.32
267,700	6.45	1.32			267,700	6.44		1.31
268,050	6.45	1.32			268,050	6.43		1.31
268,400	6.45	1.32			268,400	6.43		1.31
268,750	6.45	1.32			268,750	6.43		1.31
269,100	6.45	1.32			269,100	6.43		1.31
269,450	6.45	1.32			269,450	6.43		1.31
269,800	6.44	1.31			269,800	6.43		1.31
270,150	6.44	1.31			270,150	6.43		1.30
270,500	6.44	1.31			270,500	6.43		1.30
270,850	6.44	1.31			270,850	6.43		1.30
271,200	6.44	1.31			271,200	6.43		1.30
271,550	6.44	1.31			271,550	6.42		1.30
271,900	6.44	1.31			271,900	6.42		1.30
272,250	6.44	1.30			272,250	6.42		1.30
272,600	6.44	1.30			272,600	6.42		1.29
272,950	6.44	1.30			272,950	6.42		1.29
273,300	6.43	1.30			273,300	6.42		1.29
273,650	6.43	1.30			273,650	6.42		1.29

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
274,000	6.43	1.30			274,000	6.42		1.29
274,350	6.43	1.30			274,350	6.42		1.29
274,700	6.43	1.30			274,700	6.42		1.29
275,050	6.43	1.30			275,050	6.42		1.29
275,400	6.43	1.29			275,400	6.42		1.29
275,750	6.43	1.29			275,750	6.42		1.29
276,100	6.43	1.29			276,100	6.42		1.28
276,450	6.43	1.29			276,450	6.42		1.28
276,800	6.43	1.29			276,800	6.42		1.28
277,150	6.43	1.29			277,150	6.42		1.28
277,500	6.43	1.29			277,500	6.42		1.28
277,850	6.43	1.29			277,850	6.42		1.28
278,200	6.43	1.29			278,200	6.42		1.28
278,550	6.43	1.29			278,550	6.41		1.28
278,900	6.43	1.29			278,900	6.41		1.28
279,250	6.43	1.29			279,250	6.41		1.28
279,600	6.43	1.29			279,600	6.41		1.28
279,950	6.43	1.29			279,950	6.41		1.28
280,300	6.43	1.28			280,300	6.41		1.28
280,650	6.43	1.28			280,650	6.41		1.27
281,000	6.43	1.28			281,000	6.41		1.27
281,350	6.43	1.28			281,350	6.41		1.27
281,700	6.43	1.28			281,700	6.41		1.27
282,050	6.42	1.28			282,050	6.41		1.27
282,400	6.42	1.28			282,400	6.41		1.27
282,750	6.42	1.28			282,750	6.41		1.27
283,100	6.42	1.27			283,100	6.41		1.27
283,450	6.42	1.27			283,450	6.41		1.26
283,800	6.42	1.27			283,800	6.41		1.26
284,150	6.42	1.27			284,150	6.40		1.26
284,500	6.42	1.27			284,500	6.40		1.26
284,850	6.42	1.27			284,850	6.40		1.26
285,200	6.42	1.27			285,200	6.40		1.26
285,550	6.42	1.26			285,550	6.40		1.26
285,900	6.41	1.26			285,900	6.40		1.25
286,250	6.41	1.26			286,250	6.40		1.25
286,600	6.41	1.26			286,600	6.40		1.25
286,950	6.41	1.26			286,950	6.40		1.25
287,300	6.41	1.26			287,300	6.40		1.25
287,650	6.41	1.26			287,650	6.40		1.25
288,000	6.41	1.26			288,000	6.40		1.25
288,350	6.41	1.26			288,350	6.40		1.25
288,700	6.41	1.26			288,700	6.40		1.25
289,050	6.41	1.26			289,050	6.40		1.25
289,400	6.41	1.26			289,400	6.40		1.25
289,750	6.41	1.26			289,750	6.40		1.25
290,100	6.41	1.25			290,100	6.40		1.25
290,450	6.41	1.25			290,450	6.40		1.25
290,800	6.41	1.25			290,800	6.40		1.24
291,150	6.41	1.25			291,150	6.40		1.24
291,500	6.41	1.25			291,500	6.40		1.24

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
291,850	6.41	1.25			291,850	6.40		1.24
292,200	6.41	1.25			292,200	6.40		1.24
292,550	6.41	1.25			292,550	6.40		1.24
292,900	6.41	1.25			292,900	6.40		1.24
293,250	6.41	1.25			293,250	6.40		1.24
293,600	6.41	1.25			293,600	6.40		1.24
293,950	6.41	1.25			293,950	6.40		1.24
294,300	6.41	1.25			294,300	6.40		1.24
294,650	6.41	1.25			294,650	6.39		1.24
295,000	6.41	1.25			295,000	6.39		1.24
295,350	6.41	1.24			295,350	6.39		1.24
295,700	6.41	1.24			295,700	6.39		1.23
296,050	6.41	1.24			296,050	6.39		1.23
296,400	6.41	1.24			296,400	6.39		1.23
296,750	6.41	1.24			296,750	6.39		1.23
297,100	6.41	1.24			297,100	6.39		1.23
297,450	6.41	1.24			297,450	6.39		1.23
297,800	6.41	1.24			297,800	6.39		1.23
298,150	6.41	1.24			298,150	6.39		1.23
298,500	6.41	1.24			298,500	6.39		1.23
298,850	6.40	1.24			298,850	6.39		1.23
299,200	6.40	1.24			299,200	6.39		1.23
299,550	6.40	1.24			299,550	6.39		1.23
299,900	6.40	1.23			299,900	6.39		1.23
300,250	6.40	1.23			300,250	6.39		1.23
300,600	6.40	1.23			300,600	6.39		1.22
300,950	6.40	1.23			300,950	6.39		1.22
301,300	6.40	1.23			301,300	6.39		1.22
301,650	6.40	1.23			301,650	6.39		1.22
302,000	6.40	1.23			302,000	6.39		1.22
302,350	6.40	1.23			302,350	6.39		1.22
302,700	6.40	1.23			302,700	6.39		1.22
303,050	6.40	1.23			303,050	6.39		1.22
303,400	6.40	1.23			303,400	6.39		1.22
303,750	6.40	1.23			303,750	6.39		1.22
304,100	6.40	1.23			304,100	6.39		1.22
304,450	6.40	1.23			304,450	6.39		1.22
304,800	6.40	1.23			304,800	6.39		1.22
305,150	6.40	1.23			305,150	6.39		1.22
305,500	6.40	1.23			305,500	6.39		1.22
305,850	6.40	1.23			305,850	6.39		1.22
306,200	6.40	1.22			306,200	6.39		1.22
306,550	6.40	1.22			306,550	6.39		1.21
306,900	6.40	1.22			306,900	6.39		1.21
307,250	6.40	1.22			307,250	6.39		1.21
307,600	6.40	1.22			307,600	6.39		1.21
307,950	6.40	1.22			307,950	6.38		1.21
308,300	6.40	1.22			308,300	6.38		1.21
308,650	6.40	1.22			308,650	6.38		1.21
309,000	6.40	1.21			309,000	6.38		1.21
309,350	6.40	1.21			309,350	6.38		1.20

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
309,700	6.40	1.21			309,700	6.38		1.20
310,050	6.40	1.21			310,050	6.38		1.20
310,400	6.39	1.21			310,400	6.38		1.20
310,750	6.39	1.21			310,750	6.38		1.20
311,100	6.39	1.21			311,100	6.38		1.20
311,450	6.39	1.21			311,450	6.38		1.20
311,800	6.39	1.21			311,800	6.38		1.20
312,150	6.39	1.20			312,150	6.38		1.20
312,500	6.39	1.20			312,500	6.38		1.20
312,850	6.39	1.20			312,850	6.38		1.19
313,200	6.39	1.20			313,200	6.38		1.19
313,550	6.39	1.20			313,550	6.38		1.19
313,900	6.39	1.20			313,900	6.38		1.19
314,250	6.39	1.20			314,250	6.38		1.19
314,600	6.39	1.20			314,600	6.38		1.19
314,950	6.39	1.20			314,950	6.38		1.19
315,300	6.39	1.20			315,300	6.38		1.19
315,650	6.39	1.20			315,650	6.38		1.19
316,000	6.39	1.20			316,000	6.38		1.19
316,350	6.39	1.20			316,350	6.38		1.19
316,700	6.39	1.20			316,700	6.38		1.19
317,050	6.39	1.20			317,050	6.38		1.19
317,400	6.39	1.20			317,400	6.38		1.19
317,750	6.39	1.20			317,750	6.38		1.19
318,100	6.39	1.20			318,100	6.38		1.19
318,450	6.39	1.20			318,450	6.38		1.19
318,800	6.39	1.19			318,800	6.38		1.19
319,150	6.39	1.19			319,150	6.38		1.18
319,500	6.39	1.19			319,500	6.38		1.18
319,850	6.39	1.19			319,850	6.37		1.18
320,200	6.39	1.19			320,200	6.37		1.18
320,550	6.39	1.19			320,550	6.37		1.18
320,900	6.39	1.19			320,900	6.37		1.18
321,250	6.39	1.19			321,250	6.37		1.18
321,600	6.39	1.19			321,600	6.37		1.18
321,950	6.39	1.18			321,950	6.37		1.18
322,300	6.38	1.18			322,300	6.37		1.17
322,650	6.38	1.18			322,650	6.37		1.17
323,000	6.38	1.18			323,000	6.37		1.17
323,350	6.38	1.18			323,350	6.37		1.17
323,700	6.38	1.18			323,700	6.37		1.17
324,050	6.38	1.18			324,050	6.37		1.17
324,400	6.38	1.18			324,400	6.37		1.17
324,750	6.38	1.18			324,750	6.37		1.17
325,100	6.38	1.18			325,100	6.37		1.17
325,450	6.38	1.18			325,450	6.37		1.17
325,800	6.38	1.18			325,800	6.37		1.17
326,150	6.39	1.18			326,150	6.37		1.17
326,500	6.39	1.18			326,500	6.37		1.17
326,850	6.39	1.18			326,850	6.37		1.17
327,200	6.39	1.18			327,200	6.38		1.17

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
327,550	6.39	1.18			327,550	6.38		1.17
327,900	6.39	1.18			327,900	6.38		1.18
328,250	6.39	1.18			328,250	6.38		1.18
328,600	6.40	1.19			328,600	6.38		1.18
328,950	6.40	1.19			328,950	6.38		1.18
329,300	6.40	1.19			329,300	6.38		1.18
329,650	6.40	1.19			329,650	6.38		1.18
330,000	6.40	1.19			330,000	6.39		1.18
330,350	6.40	1.19			330,350	6.39		1.18
330,700	6.40	1.19			330,700	6.39		1.18
331,050	6.40	1.19			331,050	6.39		1.18
331,400	6.40	1.19			331,400	6.39		1.18
331,750	6.40	1.19			331,750	6.39		1.18
332,100	6.40	1.19			332,100	6.39		1.18
332,450	6.40	1.19			332,450	6.39		1.18
332,800	6.40	1.19			332,800	6.39		1.18
333,150	6.40	1.19			333,150	6.39		1.18
333,500	6.40	1.19			333,500	6.39		1.18
333,850	6.40	1.19			333,850	6.39		1.18
334,200	6.40	1.19			334,200	6.39		1.18
334,550	6.40	1.18			334,550	6.39		1.18
334,900	6.40	1.18			334,900	6.39		1.18
335,250	6.40	1.18			335,250	6.39		1.17
335,600	6.40	1.18			335,600	6.39		1.17
335,950	6.40	1.18			335,950	6.39		1.17
336,300	6.40	1.18			336,300	6.39		1.17
336,650	6.40	1.18			336,650	6.39		1.17
337,000	6.40	1.18			337,000	6.39		1.17
337,350	6.40	1.18			337,350	6.39		1.17
337,700	6.40	1.18			337,700	6.39		1.17
338,050	6.40	1.18			338,050	6.39		1.17
338,400	6.40	1.18			338,400	6.38		1.17
338,750	6.40	1.18			338,750	6.38		1.17
339,100	6.40	1.18			339,100	6.38		1.17
339,450	6.40	1.17			339,450	6.38		1.17
339,800	6.40	1.17			339,800	6.38		1.16
340,150	6.40	1.17			340,150	6.38		1.16
340,500	6.39	1.17			340,500	6.38		1.16
340,850	6.39	1.17			340,850	6.38		1.16
341,200	6.39	1.17			341,200	6.38		1.16
341,550	6.39	1.16			341,550	6.38		1.16
341,900	6.39	1.16			341,900	6.37		1.15
342,250	6.39	1.16			342,250	6.37		1.15
342,600	6.39	1.16			342,600	6.37		1.15
342,950	6.39	1.16			342,950	6.37		1.15
343,300	6.38	1.16			343,300	6.37		1.15
343,650	6.38	1.15			343,650	6.37		1.15
344,000	6.38	1.15			344,000	6.37		1.14
344,350	6.38	1.15			344,350	6.37		1.14
344,700	6.38	1.15			344,700	6.37		1.14
345,050	6.38	1.15			345,050	6.37		1.14

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
345,400	6.38	1.15			345,400	6.37		1.14
345,750	6.38	1.15			345,750	6.36		1.14
346,100	6.38	1.15			346,100	6.36		1.14
346,450	6.38	1.14			346,450	6.36		1.14
346,800	6.38	1.14			346,800	6.36		1.13
347,150	6.38	1.14			347,150	6.36		1.13
347,500	6.38	1.14			347,500	6.36		1.13
347,850	6.38	1.14			347,850	6.36		1.13
348,200	6.38	1.14			348,200	6.36		1.13
348,550	6.37	1.14			348,550	6.36		1.13
348,900	6.37	1.14			348,900	6.36		1.13
349,250	6.37	1.14			349,250	6.36		1.13
349,600	6.37	1.13			349,600	6.36		1.13
349,950	6.37	1.13			349,950	6.36		1.12
350,300	6.37	1.13			350,300	6.36		1.12
350,650	6.37	1.13			350,650	6.35		1.12
351,000	6.37	1.13			351,000	6.35		1.12
351,350	6.37	1.13			351,350	6.35		1.12
351,700	6.37	1.12			351,700	6.35		1.12
352,050	6.36	1.12			352,050	6.35		1.11
352,400	6.36	1.12			352,400	6.35		1.11
352,750	6.36	1.12			352,750	6.35		1.11
353,100	6.36	1.12			353,100	6.35		1.11
353,450	6.36	1.12			353,450	6.34		1.11
353,800	6.36	1.11			353,800	6.34		1.11
354,150	6.36	1.11			354,150	6.34		1.10
354,500	6.35	1.11			354,500	6.34		1.10
354,850	6.35	1.11			354,850	6.34		1.10
355,200	6.35	1.11			355,200	6.34		1.10
355,550	6.35	1.11			355,550	6.34		1.10
355,900	6.35	1.10			355,900	6.33		1.09
356,250	6.35	1.10			356,250	6.33		1.09
356,600	6.35	1.10			356,600	6.33		1.09
356,950	6.35	1.10			356,950	6.33		1.09
357,300	6.35	1.10			357,300	6.33		1.09
357,650	6.35	1.10			357,650	6.33		1.09
358,000	6.35	1.10			358,000	6.33		1.09
358,350	6.34	1.09			358,350	6.33		1.09
358,700	6.34	1.09			358,700	6.33		1.08
359,050	6.34	1.09			359,050	6.33		1.08
359,400	6.34	1.09			359,400	6.33		1.08
359,750	6.34	1.09			359,750	6.33		1.08
360,100	6.34	1.09			360,100	6.33		1.08
360,450	6.34	1.09			360,450	6.33		1.08
360,800	6.34	1.09			360,800	6.33		1.08
361,150	6.34	1.09			361,150	6.32		1.08
361,500	6.34	1.08			361,500	6.32		1.08
361,850	6.34	1.08			361,850	6.32		1.07
362,200	6.34	1.08			362,200	6.32		1.07
362,550	6.34	1.08			362,550	6.32		1.07
362,900	6.34	1.08			362,900	6.32		1.07

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
363,250	6.34	1.08			363,250	6.32		1.07
363,600	6.33	1.08			363,600	6.32		1.07
363,950	6.33	1.08			363,950	6.32		1.07
364,300	6.33	1.08			364,300	6.32		1.07
364,650	6.33	1.07			364,650	6.32		1.07
365,000	6.33	1.07			365,000	6.32		1.06
365,350	6.33	1.07			365,350	6.32		1.06
365,700	6.33	1.07			365,700	6.32		1.06
366,050	6.33	1.07			366,050	6.31		1.06
366,400	6.33	1.07			366,400	6.31		1.06
366,750	6.33	1.07			366,750	6.31		1.06
367,100	6.33	1.07			367,100	6.31		1.06
367,450	6.33	1.07			367,450	6.31		1.06
367,800	6.33	1.06			367,800	6.31		1.06
368,150	6.33	1.06			368,150	6.31		1.05
368,500	6.33	1.06			368,500	6.31		1.05
368,850	6.32	1.06			368,850	6.31		1.05
369,200	6.32	1.06			369,200	6.31		1.05
369,550	6.32	1.06			369,550	6.31		1.05
369,900	6.32	1.06			369,900	6.31		1.05
370,250	6.32	1.05			370,250	6.30		1.05
370,600	6.32	1.05			370,600	6.30		1.04
370,950	6.32	1.05			370,950	6.30		1.04
371,300	6.32	1.05			371,300	6.30		1.04
371,650	6.31	1.05			371,650	6.30		1.04
372,000	6.31	1.05			372,000	6.30		1.04
372,350	6.31	1.04			372,350	6.30		1.04
372,700	6.31	1.04			372,700	6.30		1.03
373,050	6.31	1.04			373,050	6.30		1.03
373,400	6.31	1.04			373,400	6.29		1.03
373,750	6.31	1.04			373,750	6.29		1.03
374,100	6.31	1.04			374,100	6.29		1.03
374,450	6.31	1.03			374,450	6.29		1.03
374,800	6.30	1.03			374,800	6.29		1.02
375,150	6.30	1.03			375,150	6.29		1.02
375,500	6.30	1.03			375,500	6.29		1.02
375,850	6.30	1.03			375,850	6.29		1.02
376,200	6.30	1.03			376,200	6.29		1.02
376,550	6.30	1.03			376,550	6.29		1.02
376,900	6.30	1.03			376,900	6.29		1.02
377,250	6.30	1.03			377,250	6.29		1.02
377,600	6.30	1.02			377,600	6.28		1.02
377,950	6.30	1.02			377,950	6.28		1.01
378,300	6.30	1.02			378,300	6.28		1.01
378,650	6.30	1.02			378,650	6.28		1.01
379,000	6.30	1.02			379,000	6.28		1.01
379,350	6.30	1.02			379,350	6.28		1.01
379,700	6.30	1.02			379,700	6.28		1.01
380,050	6.30	1.02			380,050	6.28		1.01
380,400	6.30	1.02			380,400	6.28		1.01
380,750	6.30	1.01			380,750	6.28		1.01

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
381,100	6.29	1.01			381,100	6.28		1.00
381,450	6.29	1.01			381,450	6.28		1.00
381,800	6.29	1.01			381,800	6.28		1.00
382,150	6.29	1.01			382,150	6.28		1.00
382,500	6.29	1.01			382,500	6.28		1.00
382,850	6.29	1.01			382,850	6.27		1.00
383,200	6.29	1.00			383,200	6.27		1.00
383,550	6.29	1.00			383,550	6.27		0.99
383,900	6.29	1.00			383,900	6.27		0.99
384,250	6.28	1.00			384,250	6.27		0.99
384,600	6.28	1.00			384,600	6.27		0.99
384,950	6.28	1.00			384,950	6.27		0.99
385,300	6.28	0.99			385,300	6.27		0.99
385,650	6.28	0.99			385,650	6.26		0.98
386,000	6.28	0.99			386,000	6.26		0.98
386,350	6.28	0.99			386,350	6.26		0.98
386,700	6.28	0.99			386,700	6.26		0.98
387,050	6.27	0.99			387,050	6.26		0.98
387,400	6.27	0.98			387,400	6.26		0.98
387,750	6.27	0.98			387,750	6.26		0.97
388,100	6.27	0.98			388,100	6.26		0.97
388,450	6.27	0.98			388,450	6.26		0.97
388,800	6.27	0.98			388,800	6.26		0.97
389,150	6.27	0.98			389,150	6.26		0.97
389,500	6.27	0.98			389,500	6.26		0.97
389,850	6.27	0.98			389,850	6.26		0.97
390,200	6.27	0.98			390,200	6.26		0.97
390,550	6.27	0.98			390,550	6.26		0.97
390,900	6.27	0.98			390,900	6.26		0.97
391,250	6.27	0.98			391,250	6.26		0.97
391,600	6.27	0.98			391,600	6.26		0.97
391,950	6.27	0.98			391,950	6.26		0.97
392,300	6.27	0.98			392,300	6.26		0.97
392,650	6.27	0.98			392,650	6.26		0.97
393,000	6.27	0.98			393,000	6.26		0.97
393,350	6.27	0.98			393,350	6.26		0.97
393,700	6.27	0.98			393,700	6.26		0.97
394,050	6.27	0.97			394,050	6.26		0.97
394,400	6.27	0.97			394,400	6.26		0.96
394,750	6.27	0.97			394,750	6.26		0.96
395,100	6.27	0.97			395,100	6.26		0.96
395,450	6.27	0.97			395,450	6.25		0.96
395,800	6.27	0.97			395,800	6.25		0.96
396,150	6.27	0.97			396,150	6.25		0.96
396,500	6.27	0.96			396,500	6.25		0.96
396,850	6.27	0.96			396,850	6.25		0.95
397,200	6.26	0.96			397,200	6.25		0.95
397,550	6.26	0.96			397,550	6.25		0.95
397,900	6.26	0.96			397,900	6.25		0.95
398,250	6.26	0.96			398,250	6.25		0.95
398,600	6.26	0.95			398,600	6.24		0.95

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
398,950	6.26	0.95			398,950	6.24		0.94
399,300	6.26	0.95			399,300	6.24		0.94
399,650	6.26	0.95			399,650	6.24		0.94
400,000	6.26	0.95			400,000	6.24		0.94
400,350	6.25	0.95			400,350	6.24		0.94
400,700	6.25	0.95			400,700	6.24		0.94
401,050	6.25	0.95			401,050	6.24		0.94
401,400	6.25	0.94			401,400	6.24		0.94
401,750	6.25	0.94			401,750	6.24		0.93
402,100	6.25	0.94			402,100	6.24		0.93
402,450	6.25	0.94			402,450	6.24		0.93
402,800	6.25	0.94			402,800	6.24		0.93
403,150	6.25	0.94			403,150	6.24		0.93
403,500	6.25	0.94			403,500	6.24		0.93
403,850	6.25	0.94			403,850	6.24		0.93
404,200	6.25	0.94			404,200	6.23		0.93
404,550	6.25	0.94			404,550	6.23		0.93
404,900	6.25	0.93			404,900	6.23		0.93
405,250	6.25	0.93			405,250	6.23		0.92
405,600	6.25	0.93			405,600	6.23		0.92
405,950	6.25	0.93			405,950	6.23		0.92
406,300	6.25	0.93			406,300	6.23		0.92
406,650	6.25	0.93			406,650	6.23		0.92
407,000	6.25	0.93			407,000	6.23		0.92
407,350	6.24	0.93			407,350	6.23		0.92
407,700	6.24	0.93			407,700	6.23		0.92
408,050	6.24	0.92			408,050	6.23		0.91
408,400	6.24	0.92			408,400	6.23		0.91
408,750	6.24	0.92			408,750	6.23		0.91
409,100	6.24	0.92			409,100	6.22		0.91
409,450	6.24	0.92			409,450	6.22		0.91
409,800	6.24	0.92			409,800	6.22		0.91
410,150	6.24	0.91			410,150	6.22		0.91
410,500	6.24	0.91			410,500	6.22		0.90
410,850	6.23	0.91			410,850	6.22		0.90
411,200	6.23	0.91			411,200	6.22		0.90
411,550	6.23	0.91			411,550	6.22		0.90
411,900	6.23	0.91			411,900	6.22		0.90
412,250	6.23	0.91			412,250	6.22		0.90
412,600	6.23	0.90			412,600	6.21		0.90
412,950	6.23	0.90			412,950	6.21		0.89
413,300	6.23	0.90			413,300	6.21		0.89
413,650	6.23	0.90			413,650	6.21		0.89
414,000	6.23	0.90			414,000	6.21		0.89
414,350	6.23	0.90			414,350	6.21		0.89
414,700	6.23	0.90			414,700	6.21		0.89
415,050	6.23	0.90			415,050	6.21		0.89
415,400	6.23	0.90			415,400	6.21		0.89
415,750	6.23	0.90			415,750	6.21		0.89
416,100	6.23	0.90			416,100	6.21		0.89
416,450	6.23	0.90			416,450	6.21		0.89

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
416,800	6.23	0.90			416,800	6.21		0.89
417,150	6.23	0.90			417,150	6.21		0.89
417,500	6.23	0.90			417,500	6.22		0.89
417,850	6.23	0.90			417,850	6.22		0.89
418,200	6.23	0.90			418,200	6.22		0.89
418,550	6.23	0.90			418,550	6.22		0.89
418,900	6.23	0.90			418,900	6.22		0.89
419,250	6.23	0.90			419,250	6.22		0.89
419,600	6.23	0.89			419,600	6.21		0.89
419,950	6.23	0.89			419,950	6.21		0.88
420,300	6.23	0.89			420,300	6.21		0.88
420,650	6.23	0.89			420,650	6.21		0.88
421,000	6.23	0.89			421,000	6.21		0.88
421,350	6.22	0.89			421,350	6.21		0.88
421,700	6.22	0.89			421,700	6.21		0.88
422,050	6.22	0.88			422,050	6.21		0.88
422,400	6.22	0.88			422,400	6.21		0.87
422,750	6.22	0.88			422,750	6.21		0.87
423,100	6.22	0.88			423,100	6.20		0.87
423,450	6.22	0.88			423,450	6.20		0.87
423,800	6.22	0.88			423,800	6.20		0.87
424,150	6.22	0.88			424,150	6.20		0.87
424,500	6.22	0.87			424,500	6.20		0.87
424,850	6.21	0.87			424,850	6.20		0.86
425,200	6.21	0.87			425,200	6.20		0.86
425,550	6.21	0.87			425,550	6.20		0.86
425,900	6.21	0.87			425,900	6.20		0.86
426,250	6.21	0.87			426,250	6.20		0.86
426,600	6.21	0.87			426,600	6.20		0.86
426,950	6.21	0.87			426,950	6.20		0.86
427,300	6.21	0.87			427,300	6.20		0.86
427,650	6.21	0.87			427,650	6.20		0.86
428,000	6.21	0.86			428,000	6.20		0.86
428,350	6.21	0.86			428,350	6.20		0.85
428,700	6.21	0.86			428,700	6.20		0.85
429,050	6.21	0.86			429,050	6.20		0.85
429,400	6.21	0.86			429,400	6.20		0.85
429,750	6.21	0.86			429,750	6.19		0.85
430,100	6.21	0.86			430,100	6.19		0.85
430,450	6.21	0.86			430,450	6.19		0.85
430,800	6.21	0.86			430,800	6.19		0.85
431,150	6.21	0.86			431,150	6.19		0.85
431,500	6.21	0.86			431,500	6.19		0.85
431,850	6.21	0.86			431,850	6.19		0.85
432,200	6.21	0.85			432,200	6.19		0.85
432,550	6.21	0.85			432,550	6.19		0.84
432,900	6.21	0.85			432,900	6.19		0.84
433,250	6.21	0.85			433,250	6.19		0.84
433,600	6.21	0.85			433,600	6.19		0.84
433,950	6.21	0.85			433,950	6.19		0.84
434,300	6.21	0.85			434,300	6.19		0.84

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
434,650	6.21	0.85			434,650	6.19		0.84
435,000	6.20	0.85			435,000	6.19		0.84
435,350	6.20	0.85			435,350	6.19		0.84
435,700	6.20	0.85			435,700	6.19		0.84
436,050	6.20	0.85			436,050	6.19		0.84
436,400	6.20	0.85			436,400	6.19		0.84
436,750	6.20	0.84			436,750	6.19		0.84
437,100	6.20	0.84			437,100	6.19		0.83
437,450	6.20	0.84			437,450	6.19		0.83
437,800	6.20	0.84			437,800	6.19		0.83
438,150	6.20	0.84			438,150	6.19		0.83
438,500	6.20	0.84			438,500	6.19		0.83
438,850	6.20	0.84			438,850	6.18		0.83
439,200	6.20	0.84			439,200	6.18		0.83
439,550	6.20	0.84			439,550	6.18		0.83
439,900	6.20	0.83			439,900	6.18		0.83
440,250	6.20	0.83			440,250	6.18		0.82
440,600	6.19	0.83			440,600	6.18		0.82
440,950	6.19	0.83			440,950	6.18		0.82
441,300	6.19	0.83			441,300	6.18		0.82
441,650	6.19	0.83			441,650	6.18		0.82
442,000	6.19	0.83			442,000	6.18		0.82
442,350	6.19	0.82			442,350	6.17		0.82
442,700	6.19	0.82			442,700	6.17		0.81
443,050	6.19	0.82			443,050	6.17		0.81
443,400	6.19	0.82			443,400	6.17		0.81
443,750	6.19	0.82			443,750	6.17		0.81
444,100	6.18	0.82			444,100	6.17		0.81
444,450	6.18	0.82			444,450	6.17		0.81
444,800	6.18	0.82			444,800	6.17		0.81
445,150	6.18	0.82			445,150	6.17		0.81
445,500	6.18	0.82			445,500	6.17		0.81
445,850	6.18	0.82			445,850	6.17		0.81
446,200	6.18	0.82			446,200	6.17		0.81
446,550	6.19	0.82			446,550	6.17		0.81
446,900	6.19	0.82			446,900	6.17		0.81
447,250	6.19	0.81			447,250	6.17		0.81
447,600	6.19	0.81			447,600	6.17		0.81
447,950	6.19	0.81			447,950	6.17		0.81
448,300	6.19	0.81			448,300	6.17		0.81
448,650	6.19	0.81			448,650	6.17		0.81
449,000	6.19	0.81			449,000	6.17		0.81
449,350	6.19	0.81			449,350	6.17		0.81
449,700	6.19	0.81			449,700	6.17		0.81
450,050	6.19	0.81			450,050	6.17		0.81
450,400	6.19	0.81			450,400	6.17		0.80
450,750	6.19	0.81			450,750	6.17		0.80
451,100	6.19	0.81			451,100	6.17		0.80
451,450	6.19	0.81			451,450	6.17		0.80
451,800	6.19	0.81			451,800	6.17		0.80
452,150	6.19	0.81			452,150	6.17		0.80

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
452,500	6.18	0.81			452,500	6.17		0.80
452,850	6.18	0.81			452,850	6.17		0.80
453,200	6.18	0.81			453,200	6.17		0.80
453,550	6.18	0.80			453,550	6.17		0.80
453,900	6.18	0.80			453,900	6.17		0.79
454,250	6.18	0.80			454,250	6.17		0.79
454,600	6.18	0.80			454,600	6.16		0.79
454,950	6.18	0.80			454,950	6.16		0.79
455,300	6.18	0.80			455,300	6.16		0.79
455,650	6.18	0.80			455,650	6.16		0.79
456,000	6.18	0.80			456,000	6.16		0.79
456,350	6.18	0.80			456,350	6.16		0.79
456,700	6.17	0.79			456,700	6.16		0.79
457,050	6.17	0.79			457,050	6.16		0.78
457,400	6.17	0.79			457,400	6.16		0.78
457,750	6.17	0.79			457,750	6.16		0.78
458,100	6.17	0.79			458,100	6.16		0.78
458,450	6.17	0.79			458,450	6.16		0.78
458,800	6.17	0.79			458,800	6.16		0.78
459,150	6.17	0.79			459,150	6.16		0.78
459,500	6.17	0.79			459,500	6.16		0.78
459,850	6.17	0.79			459,850	6.16		0.78
460,200	6.17	0.79			460,200	6.16		0.78
460,550	6.17	0.79			460,550	6.16		0.78
460,900	6.17	0.79			460,900	6.16		0.78
461,250	6.17	0.79			461,250	6.16		0.78
461,600	6.17	0.79			461,600	6.16		0.78
461,950	6.17	0.79			461,950	6.16		0.78
462,300	6.17	0.79			462,300	6.16		0.78
462,650	6.17	0.79			462,650	6.16		0.78
463,000	6.17	0.79			463,000	6.16		0.78
463,350	6.17	0.78			463,350	6.16		0.78
463,700	6.17	0.78			463,700	6.16		0.77
464,050	6.17	0.78			464,050	6.15		0.77
464,400	6.17	0.78			464,400	6.15		0.77
464,750	6.17	0.78			464,750	6.15		0.77
465,100	6.17	0.78			465,100	6.15		0.77
465,450	6.17	0.78			465,450	6.15		0.77
465,800	6.17	0.78			465,800	6.15		0.77
466,150	6.16	0.77			466,150	6.15		0.77
466,500	6.16	0.77			466,500	6.15		0.76
466,850	6.16	0.77			466,850	6.15		0.76
467,200	6.16	0.77			467,200	6.15		0.76
467,550	6.16	0.77			467,550	6.15		0.76
467,900	6.16	0.77			467,900	6.14		0.76
468,250	6.16	0.77			468,250	6.14		0.76
468,600	6.16	0.77			468,600	6.14		0.76
468,950	6.16	0.76			468,950	6.14		0.76
469,300	6.16	0.76			469,300	6.14		0.75
469,650	6.16	0.76			469,650	6.14		0.75
470,000	6.15	0.76			470,000	6.14		0.75

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
470,350	6.15	0.76			470,350	6.14		0.75
470,700	6.15	0.76			470,700	6.14		0.75
471,050	6.15	0.76			471,050	6.14		0.75
471,400	6.15	0.76			471,400	6.14		0.75
471,750	6.15	0.75			471,750	6.13		0.74
472,100	6.15	0.75			472,100	6.13		0.74
472,450	6.15	0.75			472,450	6.13		0.74
472,800	6.15	0.75			472,800	6.13		0.74
473,150	6.15	0.75			473,150	6.13		0.74
473,500	6.15	0.75			473,500	6.13		0.74
473,850	6.14	0.75			473,850	6.13		0.74
474,200	6.14	0.75			474,200	6.13		0.74
474,550	6.14	0.74			474,550	6.13		0.73
474,900	6.14	0.74			474,900	6.13		0.73
475,250	6.14	0.74			475,250	6.13		0.73
475,600	6.14	0.74			475,600	6.12		0.73
475,950	6.14	0.74			475,950	6.12		0.73
476,300	6.14	0.74			476,300	6.12		0.73
476,650	6.14	0.74			476,650	6.12		0.73
477,000	6.14	0.74			477,000	6.12		0.73
477,350	6.14	0.73			477,350	6.12		0.73
477,700	6.13	0.73			477,700	6.12		0.72
478,050	6.13	0.73			478,050	6.12		0.72
478,400	6.13	0.73			478,400	6.12		0.72
478,750	6.13	0.73			478,750	6.12		0.72
479,100	6.13	0.73			479,100	6.12		0.72
479,450	6.13	0.73			479,450	6.12		0.72
479,800	6.13	0.73			479,800	6.12		0.72
480,150	6.13	0.73			480,150	6.11		0.72
480,500	6.13	0.72			480,500	6.11		0.72
480,850	6.13	0.72			480,850	6.11		0.71
481,200	6.13	0.72			481,200	6.11		0.71
481,550	6.13	0.72			481,550	6.11		0.71
481,900	6.13	0.72			481,900	6.11		0.71
482,250	6.13	0.72			482,250	6.11		0.71
482,600	6.12	0.72			482,600	6.11		0.71
482,950	6.12	0.72			482,950	6.11		0.71
483,300	6.12	0.72			483,300	6.11		0.71
483,650	6.12	0.71			483,650	6.11		0.71
484,000	6.12	0.71			484,000	6.11		0.71
484,350	6.12	0.71			484,350	6.11		0.70
484,700	6.12	0.71			484,700	6.11		0.70
485,050	6.12	0.71			485,050	6.10		0.70
485,400	6.12	0.71			485,400	6.10		0.70
485,750	6.12	0.71			485,750	6.10		0.70
486,100	6.12	0.71			486,100	6.10		0.70
486,450	6.12	0.71			486,450	6.10		0.70
486,800	6.12	0.71			486,800	6.10		0.70
487,150	6.12	0.70			487,150	6.10		0.70
487,500	6.11	0.70			487,500	6.10		0.69
487,850	6.11	0.70			487,850	6.10		0.69

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
488,200	6.11	0.70			488,200	6.10		0.69
488,550	6.11	0.70			488,550	6.10		0.69
488,900	6.11	0.70			488,900	6.10		0.69
489,250	6.11	0.70			489,250	6.10		0.69
489,600	6.11	0.70			489,600	6.10		0.69
489,950	6.11	0.70			489,950	6.10		0.69
490,300	6.11	0.70			490,300	6.09		0.69
490,650	6.11	0.69			490,650	6.09		0.69
491,000	6.11	0.69			491,000	6.09		0.68
491,350	6.11	0.69			491,350	6.09		0.68
491,700	6.11	0.69			491,700	6.09		0.68
492,050	6.11	0.69			492,050	6.09		0.68
492,400	6.11	0.69			492,400	6.09		0.68
492,750	6.10	0.69			492,750	6.09		0.68
493,100	6.10	0.69			493,100	6.09		0.68
493,450	6.10	0.69			493,450	6.09		0.68
493,800	6.10	0.68			493,800	6.09		0.68
494,150	6.10	0.68			494,150	6.09		0.67
494,500	6.10	0.68			494,500	6.09		0.67
494,850	6.10	0.68			494,850	6.09		0.67
495,200	6.10	0.68			495,200	6.08		0.67
495,550	6.10	0.68			495,550	6.08		0.67
495,900	6.10	0.68			495,900	6.08		0.67
496,250	6.10	0.68			496,250	6.08		0.67
496,600	6.10	0.68			496,600	6.08		0.67
496,950	6.09	0.67			496,950	6.08		0.67
497,300	6.09	0.67			497,300	6.08		0.66
497,650	6.09	0.67			497,650	6.08		0.66
498,000	6.09	0.67			498,000	6.08		0.66
498,350	6.09	0.67			498,350	6.07		0.66
498,700	6.09	0.67			498,700	6.07		0.66
499,050	6.09	0.67			499,050	6.07		0.66
499,400	6.09	0.66			499,400	6.07		0.66
499,750	6.09	0.66			499,750	6.07		0.65
500,100	6.08	0.66			500,100	6.07		0.65
500,450	6.08	0.66			500,450	6.07		0.65
500,800	6.08	0.66			500,800	6.07		0.65
501,150	6.08	0.66			501,150	6.07		0.65
501,500	6.08	0.66			501,500	6.07		0.65
501,850	6.08	0.66			501,850	6.07		0.65
502,200	6.08	0.66			502,200	6.07		0.65
502,550	6.08	0.66			502,550	6.07		0.65
502,900	6.08	0.66			502,900	6.07		0.65
503,250	6.08	0.66			503,250	6.07		0.65
503,600	6.08	0.66			503,600	6.07		0.65
503,950	6.08	0.66			503,950	6.07		0.65
504,300	6.08	0.65			504,300	6.07		0.65
504,650	6.08	0.65			504,650	6.07		0.65
505,000	6.08	0.65			505,000	6.07		0.64
505,350	6.08	0.65			505,350	6.07		0.64
505,700	6.08	0.65			505,700	6.07		0.64

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
506,050	6.08	0.65			506,050	6.07		0.64
506,400	6.08	0.65			506,400	6.07		0.64
506,750	6.08	0.65			506,750	6.07		0.64
507,100	6.08	0.65			507,100	6.07		0.64
507,450	6.08	0.65			507,450	6.07		0.64
507,800	6.08	0.65			507,800	6.06		0.64
508,150	6.08	0.65			508,150	6.06		0.64
508,500	6.08	0.65			508,500	6.06		0.64
508,850	6.08	0.65			508,850	6.06		0.64
509,200	6.08	0.65			509,200	6.06		0.64
509,550	6.08	0.65			509,550	6.06		0.64
509,900	6.08	0.64			509,900	6.06		0.64
510,250	6.08	0.64			510,250	6.06		0.63
510,600	6.07	0.64			510,600	6.06		0.63
510,950	6.07	0.64			510,950	6.06		0.63
511,300	6.07	0.64			511,300	6.06		0.63
511,650	6.07	0.64			511,650	6.06		0.63
512,000	6.07	0.64			512,000	6.06		0.63
512,350	6.07	0.64			512,350	6.06		0.63
512,700	6.07	0.64			512,700	6.06		0.63
513,050	6.07	0.64			513,050	6.06		0.63
513,400	6.07	0.64			513,400	6.06		0.63
513,750	6.07	0.63			513,750	6.05		0.63
514,100	6.07	0.63			514,100	6.05		0.62
514,450	6.07	0.63			514,450	6.05		0.62
514,800	6.07	0.63			514,800	6.05		0.62
515,150	6.07	0.63			515,150	6.05		0.62
515,500	6.06	0.63			515,500	6.05		0.62
515,850	6.06	0.63			515,850	6.05		0.62
516,200	6.06	0.63			516,200	6.05		0.62
516,550	6.06	0.62			516,550	6.05		0.62
516,900	6.06	0.62			516,900	6.05		0.61
517,250	6.06	0.62			517,250	6.04		0.61
517,600	6.06	0.62			517,600	6.04		0.61
517,950	6.06	0.62			517,950	6.04		0.61
518,300	6.06	0.62			518,300	6.04		0.61
518,650	6.06	0.62			518,650	6.04		0.61
519,000	6.05	0.62			519,000	6.04		0.61
519,350	6.05	0.61			519,350	6.04		0.61
519,700	6.05	0.61			519,700	6.04		0.60
520,050	6.05	0.61			520,050	6.04		0.60
520,400	6.05	0.61			520,400	6.04		0.60
520,750	6.05	0.61			520,750	6.03		0.60
521,100	6.05	0.61			521,100	6.03		0.60
521,450	6.05	0.61			521,450	6.03		0.60
521,800	6.05	0.61			521,800	6.03		0.60
522,150	6.05	0.60			522,150	6.03		0.60
522,500	6.05	0.60			522,500	6.03		0.59
522,850	6.04	0.60			522,850	6.03		0.59
523,200	6.04	0.60			523,200	6.03		0.59
523,550	6.04	0.60			523,550	6.03		0.59

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
523,900	6.04	0.60			523,900	6.03		0.59
524,250	6.04	0.60			524,250	6.03		0.59
524,600	6.04	0.60			524,600	6.02		0.59
524,950	6.04	0.60			524,950	6.02		0.59
525,300	6.04	0.59			525,300	6.02		0.59
525,650	6.04	0.59			525,650	6.02		0.58
526,000	6.04	0.59			526,000	6.02		0.58
526,350	6.03	0.59			526,350	6.02		0.58
526,700	6.03	0.59			526,700	6.02		0.58
527,050	6.03	0.59			527,050	6.02		0.58
527,400	6.03	0.59			527,400	6.02		0.58
527,750	6.03	0.59			527,750	6.02		0.58
528,100	6.03	0.59			528,100	6.02		0.58
528,450	6.03	0.59			528,450	6.02		0.58
528,800	6.03	0.59			528,800	6.02		0.58
529,150	6.03	0.59			529,150	6.02		0.58
529,500	6.03	0.59			529,500	6.02		0.58
529,850	6.03	0.59			529,850	6.02		0.58
530,200	6.03	0.59			530,200	6.02		0.58
530,550	6.03	0.59			530,550	6.02		0.58
530,900	6.03	0.59			530,900	6.02		0.58
531,250	6.03	0.59			531,250	6.02		0.58
531,600	6.03	0.59			531,600	6.02		0.58
531,950	6.03	0.59			531,950	6.02		0.58
532,300	6.03	0.59			532,300	6.02		0.58
532,650	6.03	0.58			532,650	6.02		0.58
533,000	6.03	0.58			533,000	6.02		0.57
533,350	6.03	0.58			533,350	6.01		0.57
533,700	6.03	0.58			533,700	6.01		0.57
534,050	6.03	0.58			534,050	6.01		0.57
534,400	6.03	0.58			534,400	6.01		0.57
534,750	6.03	0.58			534,750	6.01		0.57
535,100	6.03	0.58			535,100	6.01		0.57
535,450	6.02	0.58			535,450	6.01		0.57
535,800	6.02	0.58			535,800	6.01		0.57
536,150	6.02	0.57			536,150	6.01		0.57
536,500	6.02	0.57			536,500	6.01		0.56
536,850	6.02	0.57			536,850	6.01		0.56
537,200	6.02	0.57			537,200	6.01		0.56
537,550	6.02	0.57			537,550	6.00		0.56
537,900	6.02	0.57			537,900	6.00		0.56
538,250	6.02	0.57			538,250	6.00		0.56
538,600	6.02	0.57			538,600	6.00		0.56
538,950	6.02	0.57			538,950	6.00		0.56
539,300	6.02	0.56			539,300	6.00		0.56
539,650	6.02	0.56			539,650	6.00		0.56
540,000	6.01	0.56			540,000	6.00		0.55
540,350	6.01	0.56			540,350	6.00		0.55
540,700	6.01	0.56			540,700	6.00		0.55
541,050	6.01	0.56			541,050	6.00		0.55
541,400	6.01	0.56			541,400	6.00		0.55

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
541,750	6.01	0.56			***541,750***	6.00		0.55
542,100	6.01	0.56			***542,100***	6.00		0.55
542,450	6.01	0.56			***542,450***	6.00		0.55
542,800	6.01	0.56			***542,800***	6.00		0.55
543,150	6.01	0.56			***543,150***	6.00		0.55
543,500	6.01	0.56			***543,500***	6.00		0.55
543,850	6.01	0.56			***543,850***	6.00		0.55
544,200	6.01	0.55			***544,200***	6.00		0.55
544,550	6.01	0.55			***544,550***	6.00		0.55
544,900	6.01	0.55			***544,900***	5.99		0.54
545,250	6.01	0.55			***545,250***	5.99		0.54
545,600	6.01	0.55			***545,600***	5.99		0.54
545,950	6.01	0.55			***545,950***	5.99		0.54
546,300	6.01	0.55			***546,300***	5.99		0.54
546,650	6.01	0.55			***546,650***	5.99		0.54
547,000	6.01	0.55			***547,000***	5.99		0.54
547,350	6.01	0.55			***547,350***	5.99		0.54
547,700	6.01	0.55			***547,700***	5.99		0.54
548,050	6.01	0.55			***548,050***	5.99		0.54
548,400	6.01	0.55			***548,400***	5.99		0.54
548,750	6.01	0.55			***548,750***	5.99		0.54
549,100	6.01	0.55			***549,100***	5.99		0.54
549,450	6.01	0.55			***549,450***	5.99		0.54
549,800	6.01	0.55			***549,800***	5.99		0.54
550,150	6.01	0.55			***550,150***	5.99		0.54
550,500	6.01	0.55			***550,500***	5.99		0.54
550,850	6.01	0.54			***550,850***	5.99		0.54
551,200	6.00	0.54			***551,200***	5.99		0.54
551,550	6.00	0.54			***551,550***	5.99		0.53
551,900	6.00	0.54			***551,900***	5.99		0.53
552,250	6.00	0.54			***552,250***	5.99		0.53
552,600	6.00	0.54			***552,600***	5.99		0.53
552,950	6.00	0.54			***552,950***	5.99		0.53
553,300	6.00	0.54			***553,300***	5.99		0.53
553,650	6.00	0.54			***553,650***	5.99		0.53
554,000	6.00	0.54			***554,000***	5.98		0.53
554,350	6.00	0.54			***554,350***	5.98		0.53
554,700	6.00	0.53			***554,700***	5.98		0.53
555,050	6.00	0.53			***555,050***	5.98		0.52
555,400	6.00	0.53			***555,400***	5.98		0.52
555,750	6.00	0.53			***555,750***	5.98		0.52
556,100	5.99	0.53			***556,100***	5.98		0.52
556,450	5.99	0.53			***556,450***	5.98		0.52
556,800	5.99	0.53			***556,800***	5.98		0.52
557,150	5.99	0.53			***557,150***	5.98		0.52
557,500	5.99	0.53			***557,500***	5.98		0.52
557,850	5.99	0.53			***557,850***	5.98		0.52
558,200	5.99	0.52			***558,200***	5.97		0.52
558,550	5.99	0.52			***558,550***	5.97		0.51
558,900	5.99	0.52			***558,900***	5.97		0.51
559,250	5.99	0.52			***559,250***	5.97		0.51

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
559,600	5.99	0.52			***559,600***	5.97		0.51
559,950	5.99	0.52			***559,950***	5.97		0.51
560,300	5.99	0.52			***560,300***	5.97		0.51
560,650	5.98	0.52			***560,650***	5.97		0.51
561,000	5.98	0.52			***561,000***	5.97		0.51
561,350	5.98	0.52			***561,350***	5.97		0.51
561,700	5.98	0.51			***561,700***	5.97		0.51
562,050	5.98	0.51			***562,050***	5.97		0.50
562,400	5.98	0.51			***562,400***	5.97		0.50
562,750	5.98	0.51			***562,750***	5.97		0.50
563,100	5.98	0.51			***563,100***	5.96		0.50
563,450	5.98	0.51			***563,450***	5.96		0.50
563,800	5.98	0.51			***563,800***	5.96		0.50
564,150	5.98	0.51			***564,150***	5.96		0.50
564,500	5.98	0.51			***564,500***	5.96		0.50
564,850	5.98	0.51			***564,850***	5.96		0.50
565,200	5.98	0.51			***565,200***	5.96		0.50
565,550	5.98	0.51			***565,550***	5.96		0.50
565,900	5.98	0.51			***565,900***	5.96		0.50
566,250	5.98	0.51			***566,250***	5.96		0.50
566,600	5.98	0.50			***566,600***	5.96		0.50
566,950	5.98	0.50			***566,950***	5.96		0.50
567,300	5.98	0.50			***567,300***	5.96		0.50
567,650	5.98	0.50			***567,650***	5.96		0.49
568,000	5.98	0.50			***568,000***	5.96		0.49
568,350	5.97	0.50			***568,350***	5.96		0.49
568,700	5.97	0.50			***568,700***	5.96		0.49
569,050	5.97	0.50			***569,050***	5.96		0.49
569,400	5.97	0.50			***569,400***	5.96		0.49
569,750	5.97	0.50			***569,750***	5.96		0.49
570,100	5.97	0.50			***570,100***	5.96		0.49
570,450	5.97	0.50			***570,450***	5.96		0.49
570,800	5.97	0.50			***570,800***	5.96		0.49
571,150	5.97	0.50			***571,150***	5.96		0.49
571,500	5.97	0.50			***571,500***	5.96		0.49
571,850	5.97	0.50			***571,850***	5.96		0.49
572,200	5.97	0.50			***572,200***	5.96		0.49
572,550	5.97	0.49			***572,550***	5.95		0.49
572,900	5.97	0.49			***572,900***	5.95		0.48
573,250	5.97	0.49			***573,250***	5.95		0.48
573,600	5.97	0.49			***573,600***	5.95		0.48
573,950	5.97	0.49			***573,950***	5.95		0.48
574,300	5.97	0.49			***574,300***	5.95		0.48
574,650	5.96	0.49			***574,650***	5.95		0.48
575,000	5.96	0.49			***575,000***	5.95		0.48
575,350	5.96	0.49			***575,350***	5.95		0.48
575,700	5.96	0.49			***575,700***	5.95		0.48
576,050	5.96	0.48			***576,050***	5.95		0.48
576,400	5.96	0.48			***576,400***	5.95		0.47
576,750	5.96	0.48			***576,750***	5.95		0.47
577,100	5.96	0.48			***577,100***	5.94		0.47

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
577,450	5.96	0.48			577,450	5.94		0.47
577,800	5.96	0.48			577,800	5.94		0.47
578,150	5.96	0.48			578,150	5.94		0.47
578,500	5.96	0.48			578,500	5.94		0.47
578,850	5.96	0.48			578,850	5.94		0.47
579,200	5.96	0.48			579,200	5.94		0.47
579,550	5.96	0.48			579,550	5.94		0.47
579,900	5.95	0.47			579,900	5.94		0.47
580,250	5.95	0.47			580,250	5.94		0.46
580,600	5.95	0.47			580,600	5.94		0.46
580,950	5.95	0.47			580,950	5.94		0.46
581,300	5.95	0.47			581,300	5.94		0.46
581,650	5.95	0.47			581,650	5.94		0.46
582,000	5.95	0.47			582,000	5.94		0.46
582,350	5.95	0.47			582,350	5.93		0.46
582,700	5.95	0.47			582,700	5.93		0.46
583,050	5.95	0.47			583,050	5.93		0.46
583,400	5.95	0.47			583,400	5.93		0.46
583,750	5.95	0.47			583,750	5.93		0.46
584,100	5.95	0.47			584,100	5.93		0.46
584,450	5.95	0.46			584,450	5.93		0.46
584,800	5.95	0.46			584,800	5.93		0.46
585,150	5.95	0.46			585,150	5.93		0.46
585,500	5.95	0.46			585,500	5.93		0.45
585,850	5.95	0.46			585,850	5.93		0.45
586,200	5.95	0.46			586,200	5.93		0.45
586,550	5.95	0.46			586,550	5.93		0.45
586,900	5.95	0.46			586,900	5.93		0.45
587,250	5.95	0.46			587,250	5.93		0.45
587,600	5.95	0.46			587,600	5.93		0.45
587,950	5.95	0.46			587,950	5.93		0.45
588,300	5.95	0.46			588,300	5.93		0.45
588,650	5.95	0.46			588,650	5.93		0.45
589,000	5.95	0.46			589,000	5.93		0.45
589,350	5.95	0.46			589,350	5.93		0.45
589,700	5.95	0.46			589,700	5.93		0.45
590,050	5.95	0.46			590,050	5.93		0.45
590,400	5.94	0.46			590,400	5.93		0.45
590,750	5.94	0.46			590,750	5.93		0.45
591,100	5.94	0.46			591,100	5.93		0.45
591,450	5.94	0.46			591,450	5.93		0.45
591,800	5.94	0.45			591,800	5.93		0.45
592,150	5.94	0.45			592,150	5.93		0.44
592,500	5.94	0.45			592,500	5.93		0.44
592,850	5.94	0.45			592,850	5.93		0.44
593,200	5.94	0.45			593,200	5.92		0.44
593,550	5.94	0.45			593,550	5.92		0.44
593,900	5.94	0.45			593,900	5.92		0.44
594,250	5.94	0.45			594,250	5.92		0.44
594,600	5.94	0.45			594,600	5.92		0.44
594,950	5.94	0.45			594,950	5.92		0.44

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
595,300	5.94	0.45			595,300	5.92		0.44
595,650	5.94	0.44			595,650	5.92		0.44
596,000	5.94	0.44			596,000	5.92		0.44
596,350	5.94	0.44			596,350	5.92		0.44
596,700	5.94	0.44			596,700	5.92		0.43
597,050	5.93	0.44			597,050	5.92		0.43
597,400	5.93	0.44			597,400	5.92		0.43
597,750	5.93	0.44			597,750	5.92		0.43
598,100	5.93	0.44			598,100	5.92		0.43
598,450	5.93	0.44			598,450	5.92		0.43
598,800	5.93	0.44			598,800	5.92		0.43
599,150	5.93	0.44			599,150	5.92		0.43
599,500	5.93	0.44			599,500	5.92		0.43
599,850	5.93	0.44			599,850	5.92		0.43
600,200	5.93	0.44			600,200	5.92		0.43
600,550	5.93	0.44			600,550	5.92		0.43
600,900	5.93	0.44			600,900	5.92		0.43
601,250	5.93	0.44			601,250	5.92		0.43
601,600	5.93	0.44			601,600	5.92		0.43
601,950	5.93	0.44			601,950	5.92		0.43
602,300	5.93	0.44			602,300	5.92		0.43
602,650	5.93	0.44			602,650	5.92		0.43
603,000	5.93	0.44			603,000	5.92		0.43
603,350	5.93	0.43			603,350	5.91		0.43
603,700	5.93	0.43			603,700	5.91		0.42
604,050	5.93	0.43			604,050	5.91		0.42
604,400	5.93	0.43			604,400	5.91		0.42
604,750	5.93	0.43			604,750	5.91		0.42
605,100	5.92	0.43			605,100	5.91		0.42
605,450	5.92	0.43			605,450	5.91		0.42
605,800	5.92	0.43			605,800	5.91		0.42
606,150	5.92	0.42			606,150	5.91		0.42
606,500	5.92	0.42			606,500	5.91		0.41
606,850	5.92	0.42			606,850	5.90		0.41
607,200	5.92	0.42			607,200	5.90		0.41
607,550	5.92	0.42			607,550	5.90		0.41
607,900	5.92	0.42			607,900	5.90		0.41
608,250	5.92	0.42			608,250	5.90		0.41
608,600	5.91	0.42			608,600	5.90		0.41
608,950	5.91	0.42			608,950	5.90		0.41
609,300	5.91	0.42			609,300	5.90		0.41
609,650	5.91	0.42			609,650	5.90		0.41
610,000	5.91	0.42			610,000	5.90		0.41
610,350	5.91	0.42			610,350	5.90		0.41
610,700	5.91	0.42			610,700	5.90		0.41
611,050	5.91	0.42			611,050	5.90		0.41
611,400	5.91	0.42			611,400	5.90		0.41
611,750	5.91	0.41			611,750	5.90		0.41
612,100	5.91	0.41			612,100	5.90		0.41
612,450	5.91	0.41			612,450	5.90		0.41
612,800	5.91	0.41			612,800	5.90		0.41

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
613,150	5.91	0.41			613,150	5.90		0.40
613,500	5.91	0.41			613,500	5.90		0.40
613,850	5.91	0.41			613,850	5.90		0.40
614,200	5.91	0.41			614,200	5.90		0.40
614,550	5.91	0.41			614,550	5.90		0.40
614,900	5.91	0.41			614,900	5.90		0.40
615,250	5.91	0.41			615,250	5.90		0.40
615,600	5.91	0.41			615,600	5.90		0.40
615,950	5.91	0.41			615,950	5.90		0.40
616,300	5.91	0.41			616,300	5.90		0.40
616,650	5.91	0.41			616,650	5.90		0.40
617,000	5.91	0.41			617,000	5.90		0.40
617,350	5.91	0.41			617,350	5.90		0.40
617,700	5.91	0.41			617,700	5.89		0.40
618,050	5.91	0.41			618,050	5.89		0.40
618,400	5.91	0.40			618,400	5.89		0.40
618,750	5.91	0.40			618,750	5.89		0.39
619,100	5.91	0.40			619,100	5.89		0.39
619,450	5.91	0.40			619,450	5.89		0.39
619,800	5.91	0.40			619,800	5.89		0.39
620,150	5.91	0.40			620,150	5.89		0.39
620,500	5.91	0.40			620,500	5.89		0.39
620,850	5.90	0.40			620,850	5.89		0.39
621,200	5.90	0.40			621,200	5.89		0.39
621,550	5.90	0.40			621,550	5.89		0.39
621,900	5.90	0.40			621,900	5.89		0.39
622,250	5.90	0.40			622,250	5.89		0.39
622,600	5.90	0.40			622,600	5.89		0.39
622,950	5.90	0.40			622,950	5.89		0.39
623,300	5.90	0.40			623,300	5.89		0.39
623,650	5.90	0.39			623,650	5.89		0.39
624,000	5.90	0.39			624,000	5.89		0.39
624,350	5.90	0.39			624,350	5.89		0.38
624,700	5.90	0.39			624,700	5.88		0.38
625,050	5.90	0.39			625,050	5.88		0.38
625,400	5.90	0.39			625,400	5.88		0.38
625,750	5.90	0.39			625,750	5.88		0.38
626,100	5.90	0.39			626,100	5.88		0.38
626,450	5.90	0.39			626,450	5.88		0.38
626,800	5.90	0.39			626,800	5.88		0.38
627,150	5.90	0.39			627,150	5.88		0.38
627,500	5.90	0.39			627,500	5.88		0.38
627,850	5.90	0.39			627,850	5.88		0.38
628,200	5.89	0.39			628,200	5.88		0.38
628,550	5.89	0.39			628,550	5.88		0.38
628,900	5.89	0.38			628,900	5.88		0.38
629,250	5.89	0.38			629,250	5.88		0.38
629,600	5.89	0.38			629,600	5.88		0.37
629,950	5.89	0.38			629,950	5.88		0.37
630,300	5.89	0.38			630,300	5.88		0.37
630,650	5.89	0.38			630,650	5.88		0.37

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
631,000	5.89	0.38			631,000	5.88		0.37
631,350	5.89	0.38			631,350	5.88		0.37
631,700	5.89	0.38			631,700	5.88		0.37
632,050	5.89	0.38			632,050	5.87		0.37
632,400	5.89	0.38			632,400	5.87		0.37
632,750	5.89	0.38			632,750	5.87		0.37
633,100	5.89	0.38			633,100	5.87		0.37
633,450	5.89	0.38			633,450	5.87		0.37
633,800	5.89	0.37			633,800	5.87		0.37
634,150	5.89	0.37			634,150	5.87		0.36
634,500	5.89	0.37			634,500	5.87		0.36
634,850	5.89	0.37			634,850	5.87		0.36
635,200	5.88	0.37			635,200	5.87		0.36
635,550	5.88	0.37			635,550	5.87		0.36
635,900	5.88	0.37			635,900	5.87		0.36
636,250	5.88	0.37			636,250	5.87		0.36
636,600	5.88	0.37			636,600	5.87		0.36
636,950	5.88	0.37			636,950	5.87		0.36
637,300	5.88	0.37			637,300	5.87		0.36
637,650	5.88	0.37			637,650	5.87		0.36
638,000	5.88	0.37			638,000	5.87		0.36
638,350	5.88	0.36			638,350	5.87		0.36
638,700	5.88	0.36			638,700	5.86		0.36
639,050	5.88	0.36			639,050	5.86		0.35
639,400	5.88	0.36			639,400	5.86		0.35
639,750	5.88	0.36			639,750	5.86		0.35
640,100	5.88	0.36			640,100	5.86		0.35
640,450	5.88	0.36			640,450	5.86		0.35
640,800	5.88	0.36			640,800	5.86		0.35
641,150	5.88	0.36			641,150	5.86		0.35
641,500	5.88	0.36			641,500	5.86		0.35
641,850	5.88	0.36			641,850	5.86		0.35
642,200	5.88	0.36			642,200	5.86		0.35
642,550	5.87	0.36			642,550	5.86		0.35
642,900	5.87	0.36			642,900	5.86		0.35
643,250	5.87	0.36			643,250	5.86		0.35
643,600	5.87	0.36			643,600	5.86		0.35
643,950	5.87	0.35			643,950	5.86		0.35
644,300	5.87	0.35			644,300	5.86		0.35
644,650	5.87	0.35			644,650	5.86		0.34
645,000	5.87	0.35			645,000	5.86		0.34
645,350	5.87	0.35			645,350	5.86		0.34
645,700	5.87	0.35			645,700	5.86		0.34
646,050	5.87	0.35			646,050	5.85		0.34
646,400	5.87	0.35			646,400	5.85		0.34
646,750	5.87	0.35			646,750	5.85		0.34
647,100	5.87	0.35			647,100	5.85		0.34
647,450	5.87	0.35			647,450	5.85		0.34
647,800	5.87	0.35			647,800	5.85		0.34
648,150	5.87	0.35			648,150	5.85		0.34
648,500	5.87	0.35			648,500	5.85		0.34

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
648,850	5.87	0.35			648,850	5.85		0.34
649,200	5.87	0.35			649,200	5.85		0.34
649,550	5.87	0.34			649,550	5.85		0.34
649,900	5.86	0.34			649,900	5.85		0.33
650,250	5.86	0.34			650,250	5.85		0.33
650,600	5.86	0.34			650,600	5.85		0.33
650,950	5.86	0.34			650,950	5.85		0.33
651,300	5.86	0.34			651,300	5.85		0.33
651,650	5.86	0.34			651,650	5.85		0.33
652,000	5.86	0.34			652,000	5.85		0.33
652,350	5.86	0.34			652,350	5.85		0.33
652,700	5.86	0.34			652,700	5.85		0.33
653,050	5.86	0.34			653,050	5.85		0.33
653,400	5.86	0.34			653,400	5.85		0.33
653,750	5.86	0.34			653,750	5.85		0.33
654,100	5.86	0.34			654,100	5.84		0.33
654,450	5.86	0.34			654,450	5.84		0.33
654,800	5.86	0.34			654,800	5.84		0.33
655,150	5.86	0.33			655,150	5.84		0.33
655,500	5.86	0.33			655,500	5.84		0.33
655,850	5.86	0.33			655,850	5.84		0.33
656,200	5.86	0.33			656,200	5.84		0.32
656,550	5.86	0.33			656,550	5.84		0.32
656,900	5.86	0.33			656,900	5.84		0.32
657,250	5.86	0.33			657,250	5.84		0.32
657,600	5.86	0.33			657,600	5.84		0.32
657,950	5.86	0.33			657,950	5.84		0.32
658,300	5.86	0.33			658,300	5.84		0.32
658,650	5.86	0.33			658,650	5.84		0.32
659,000	5.86	0.33			659,000	5.84		0.32
659,350	5.86	0.33			659,350	5.84		0.32
659,700	5.86	0.33			659,700	5.84		0.32
660,050	5.86	0.33			660,050	5.84		0.32
660,400	5.86	0.33			660,400	5.84		0.32
660,750	5.86	0.33			660,750	5.84		0.32
661,100	5.86	0.33			661,100	5.84		0.32
661,450	5.86	0.33			661,450	5.84		0.32
661,800	5.86	0.33			661,800	5.84		0.32
662,150	5.86	0.33			662,150	5.84		0.32
662,500	5.86	0.33			662,500	5.84		0.32
662,850	5.86	0.33			662,850	5.84		0.32
663,200	5.86	0.33			663,200	5.84		0.32
663,550	5.86	0.33			663,550	5.84		0.32
663,900	5.86	0.33			663,900	5.84		0.32
664,250	5.86	0.33			664,250	5.84		0.32
664,600	5.86	0.33			664,600	5.84		0.32
664,950	5.86	0.33			664,950	5.84		0.32
665,300	5.86	0.33			665,300	5.84		0.32
665,650	5.86	0.33			665,650	5.84		0.32
666,000	5.86	0.33			666,000	5.84		0.32
666,350	5.86	0.33			666,350	5.84		0.32

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
666,700	5.85	0.32			666,700	5.84		0.32
667,050	5.85	0.32			667,050	5.84		0.31
667,400	5.85	0.32			667,400	5.84		0.31
667,750	5.85	0.32			667,750	5.84		0.31
668,100	5.85	0.32			668,100	5.84		0.31
668,450	5.85	0.32			668,450	5.84		0.31
668,800	5.85	0.32			668,800	5.83		0.31
669,150	5.85	0.32			669,150	5.83		0.31
669,500	5.85	0.32			669,500	5.83		0.31
669,850	5.85	0.32			669,850	5.83		0.31
670,200	5.85	0.32			670,200	5.83		0.31
670,550	5.85	0.31			670,550	5.83		0.31
670,900	5.84	0.31			670,900	5.83		0.30
671,250	5.84	0.31			671,250	5.83		0.30
671,600	5.84	0.31			671,600	5.83		0.30
671,950	5.84	0.31			671,950	5.83		0.30
672,300	5.84	0.31			672,300	5.83		0.30
672,650	5.84	0.31			672,650	5.83		0.30
673,000	5.84	0.31			673,000	5.83		0.30
673,350	5.84	0.31			673,350	5.83		0.30
673,700	5.84	0.31			673,700	5.83		0.30
674,050	5.84	0.31			674,050	5.83		0.30
674,400	5.84	0.31			674,400	5.83		0.30
674,750	5.84	0.31			674,750	5.83		0.30
675,100	5.84	0.31			675,100	5.83		0.30
675,450	5.84	0.31			675,450	5.82		0.30
675,800	5.84	0.31			675,800	5.82		0.30
676,150	5.84	0.31			676,150	5.82		0.30
676,500	5.84	0.31			676,500	5.82		0.30
676,850	5.84	0.31			676,850	5.82		0.30
677,200	5.84	0.30			677,200	5.82		0.30
677,550	5.84	0.30			677,550	5.82		0.30
677,900	5.84	0.30			677,900	5.82		0.29
678,250	5.84	0.30			678,250	5.82		0.29
678,600	5.84	0.30			678,600	5.82		0.29
678,950	5.84	0.30			678,950	5.82		0.29
679,300	5.83	0.30			679,300	5.82		0.29
679,650	5.83	0.30			679,650	5.82		0.29
680,000	5.83	0.30			680,000	5.82		0.29
680,350	5.83	0.30			680,350	5.82		0.29
680,700	5.83	0.30			680,700	5.82		0.29
681,050	5.83	0.30			681,050	5.82		0.29
681,400	5.83	0.29			681,400	5.81		0.29
681,750	5.83	0.29			681,750	5.81		0.28
682,100	5.83	0.29			682,100	5.81		0.28
682,450	5.83	0.29			682,450	5.81		0.28
682,800	5.83	0.29			682,800	5.81		0.28
683,150	5.83	0.29			683,150	5.81		0.28
683,500	5.82	0.29			683,500	5.81		0.28
683,850	5.82	0.29			683,850	5.81		0.28
684,200	5.82	0.29			684,200	5.81		0.28

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
684,550	5.82	0.29			684,550	5.81		0.28
684,900	5.82	0.29			684,900	5.81		0.28
685,250	5.82	0.29			685,250	5.81		0.28
685,600	5.82	0.29			685,600	5.81		0.28
685,950	5.82	0.29			685,950	5.81		0.28
686,300	5.82	0.29			686,300	5.81		0.28
686,650	5.82	0.29			686,650	5.81		0.28
687,000	5.83	0.29			687,000	5.81		0.28
687,350	5.83	0.29			687,350	5.81		0.28
687,700	5.83	0.29			687,700	5.81		0.28
688,050	5.83	0.29			688,050	5.81		0.28
688,400	5.83	0.29			688,400	5.81		0.28
688,750	5.83	0.29			688,750	5.81		0.28
689,100	5.83	0.29			689,100	5.81		0.28
689,450	5.83	0.29			689,450	5.81		0.28
689,800	5.83	0.29			689,800	5.81		0.28
690,150	5.83	0.29			690,150	5.81		0.28
690,500	5.83	0.29			690,500	5.81		0.28
690,850	5.83	0.29			690,850	5.81		0.28
691,200	5.83	0.28			691,200	5.81		0.28
691,550	5.82	0.28			691,550	5.81		0.28
691,900	5.82	0.28			691,900	5.81		0.27
692,250	5.82	0.28			692,250	5.81		0.27
692,600	5.82	0.28			692,600	5.81		0.27
692,950	5.82	0.28			692,950	5.81		0.27
693,300	5.82	0.28			693,300	5.81		0.27
693,650	5.82	0.28			693,650	5.81		0.27
694,000	5.82	0.28			694,000	5.80		0.27
694,350	5.82	0.28			694,350	5.80		0.27
694,700	5.82	0.28			694,700	5.80		0.27
695,050	5.82	0.28			695,050	5.80		0.27
695,400	5.82	0.27			695,400	5.80		0.27
695,750	5.82	0.27			695,750	5.80		0.26
696,100	5.81	0.27			696,100	5.80		0.26
696,450	5.81	0.27			696,450	5.80		0.26
696,800	5.81	0.27			696,800	5.80		0.26
697,150	5.81	0.27			697,150	5.80		0.26
697,500	5.81	0.27			697,500	5.80		0.26
697,850	5.81	0.27			697,850	5.80		0.26
698,200	5.81	0.27			698,200	5.80		0.26
698,550	5.81	0.27			698,550	5.80		0.26
698,900	5.81	0.27			698,900	5.80		0.26
699,250	5.81	0.27			699,250	5.80		0.26
699,600	5.81	0.27			699,600	5.80		0.26
699,950	5.81	0.27			699,950	5.80		0.26
700,300	5.81	0.27			700,300	5.80		0.26
700,650	5.81	0.27			700,650	5.80		0.26
701,000	5.81	0.27			701,000	5.80		0.26
701,350	5.81	0.27			701,350	5.80		0.26
701,700	5.81	0.27			701,700	5.80		0.26
702,050	5.81	0.27			702,050	5.79		0.26

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
702,400	5.81	0.27			702,400	5.79		0.26
702,750	5.81	0.26			702,750	5.79		0.26
703,100	5.81	0.26			703,100	5.79		0.26
703,450	5.81	0.26			703,450	5.79		0.26
703,800	5.81	0.26			703,800	5.79		0.25
704,150	5.81	0.26			704,150	5.79		0.25
704,500	5.81	0.26			704,500	5.79		0.25
704,850	5.81	0.26			704,850	5.79		0.25
705,200	5.81	0.26			705,200	5.79		0.25
705,550	5.81	0.26			705,550	5.79		0.25
705,900	5.81	0.26			705,900	5.79		0.25
706,250	5.81	0.26			706,250	5.79		0.25
706,600	5.81	0.26			706,600	5.79		0.25
706,950	5.81	0.26			706,950	5.79		0.25
707,300	5.81	0.26			707,300	5.79		0.25
707,650	5.81	0.26			707,650	5.79		0.25
708,000	5.81	0.26			708,000	5.79		0.25
708,350	5.81	0.26			708,350	5.79		0.25
708,700	5.80	0.26			708,700	5.79		0.25
709,050	5.80	0.26			709,050	5.79		0.25
709,400	5.80	0.26			709,400	5.79		0.25
709,750	5.80	0.26			709,750	5.79		0.25
710,100	5.80	0.26			710,100	5.79		0.25
710,450	5.80	0.25			710,450	5.79		0.25
710,800	5.80	0.25			710,800	5.79		0.25
711,150	5.80	0.25			711,150	5.79		0.24
711,500	5.80	0.25			711,500	5.79		0.24
711,850	5.80	0.25			711,850	5.78		0.24
712,200	5.80	0.25			712,200	5.78		0.24
712,550	5.80	0.25			712,550	5.78		0.24
712,900	5.80	0.25			712,900	5.78		0.24
713,250	5.80	0.25			713,250	5.78		0.24
713,600	5.80	0.25			713,600	5.78		0.24
713,950	5.80	0.25			713,950	5.78		0.24
714,300	5.79	0.25			714,300	5.78		0.24
714,650	5.79	0.25			714,650	5.78		0.24
715,000	5.79	0.24			715,000	5.78		0.24
715,350	5.79	0.24			715,350	5.78		0.23
715,700	5.79	0.24			715,700	5.78		0.23
716,050	5.79	0.24			716,050	5.78		0.23
716,400	5.79	0.24			716,400	5.78		0.23
716,750	5.79	0.24			716,750	5.78		0.23
717,100	5.79	0.24			717,100	5.78		0.23
717,450	5.79	0.24			717,450	5.78		0.23
717,800	5.79	0.24			717,800	5.78		0.23
718,150	5.79	0.24			718,150	5.78		0.23
718,500	5.79	0.24			718,500	5.77		0.23
718,850	5.79	0.24			718,850	5.77		0.23
719,200	5.79	0.24			719,200	5.77		0.23
719,550	5.79	0.24			719,550	5.77		0.23
719,900	5.79	0.24			719,900	5.77		0.23

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
720,250	5.79	0.24			720,250	5.77		0.23
720,600	5.79	0.24			720,600	5.77		0.23
720,950	5.79	0.24			720,950	5.77		0.23
721,300	5.79	0.24			721,300	5.77		0.23
721,650	5.79	0.24			721,650	5.77		0.23
722,000	5.79	0.24			722,000	5.77		0.23
722,350	5.79	0.24			722,350	5.77		0.23
722,700	5.79	0.24			722,700	5.77		0.23
723,050	5.79	0.24			723,050	5.77		0.23
723,400	5.79	0.24			723,400	5.78		0.23
723,750	5.79	0.24			723,750	5.78		0.23
724,100	5.79	0.24			724,100	5.78		0.23
724,450	5.79	0.24			724,450	5.78		0.23
724,800	5.79	0.24			724,800	5.78		0.23
725,150	5.79	0.24			725,150	5.78		0.23
725,500	5.80	0.24			725,500	5.78		0.23
725,850	5.80	0.24			725,850	5.78		0.23
726,200	5.80	0.24			726,200	5.78		0.23
726,550	5.80	0.24			726,550	5.78		0.23
726,900	5.80	0.24			726,900	5.78		0.23
727,250	5.80	0.24			727,250	5.78		0.24
727,600	5.80	0.24			727,600	5.78		0.24
727,950	5.80	0.24			727,950	5.79		0.24
728,300	5.80	0.25			728,300	5.79		0.24
728,650	5.80	0.25			728,650	5.79		0.24
729,000	5.80	0.25			729,000	5.79		0.24
729,350	5.80	0.25			729,350	5.79		0.24
729,700	5.80	0.25			729,700	5.79		0.24
730,050	5.80	0.25			730,050	5.79		0.24
730,400	5.80	0.25			730,400	5.79		0.24
730,750	5.80	0.25			730,750	5.79		0.24
731,100	5.80	0.25			731,100	5.79		0.24
731,450	5.81	0.25			731,450	5.79		0.24
731,800	5.81	0.25			731,800	5.79		0.24
732,150	5.81	0.25			732,150	5.79		0.24
732,500	5.81	0.25			732,500	5.79		0.24
732,850	5.81	0.25			732,850	5.79		0.24
733,200	5.81	0.25			733,200	5.79		0.24
733,550	5.81	0.25			733,550	5.79		0.24
733,900	5.81	0.25			733,900	5.79		0.24
734,250	5.81	0.25			734,250	5.79		0.24
734,600	5.81	0.25			734,600	5.79		0.24
734,950	5.81	0.25			734,950	5.80		0.24
735,300	5.81	0.25			735,300	5.80		0.24
735,650	5.81	0.25			735,650	5.80		0.24
736,000	5.81	0.25			736,000	5.80		0.24
736,350	5.81	0.25			736,350	5.80		0.24
736,700	5.81	0.25			736,700	5.80		0.25
737,050	5.81	0.25			737,050	5.80		0.25
737,400	5.81	0.25			737,400	5.80		0.25
737,750	5.81	0.26			737,750	5.80		0.25

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
738,100	5.81	0.26			738,100	5.80		0.25
738,450	5.81	0.26			738,450	5.80		0.25
738,800	5.82	0.26			738,800	5.80		0.25
739,150	5.82	0.26			739,150	5.80		0.25
739,500	5.82	0.26			739,500	5.80		0.25
739,850	5.82	0.26			739,850	5.80		0.25
740,200	5.82	0.26			740,200	5.80		0.25
740,550	5.82	0.26			740,550	5.80		0.25
740,900	5.82	0.26			740,900	5.80		0.25
741,250	5.82	0.26			741,250	5.80		0.25
741,600	5.82	0.26			741,600	5.80		0.25
741,950	5.82	0.26			741,950	5.80		0.25
742,300	5.82	0.26			742,300	5.81		0.25
742,650	5.82	0.26			742,650	5.81		0.25
743,000	5.82	0.26			743,000	5.81		0.25
743,350	5.82	0.26			743,350	5.81		0.25
743,700	5.82	0.26			743,700	5.81		0.25
744,050	5.82	0.26			744,050	5.81		0.25
744,400	5.82	0.26			744,400	5.81		0.25
744,750	5.82	0.26			744,750	5.81		0.25
745,100	5.82	0.26			745,100	5.81		0.25
745,450	5.82	0.26			745,450	5.81		0.25
745,800	5.82	0.26			745,800	5.81		0.25
746,150	5.83	0.26			746,150	5.81		0.25
746,500	5.83	0.26			746,500	5.81		0.26
746,850	5.83	0.26			746,850	5.81		0.26
747,200	5.83	0.26			747,200	5.81		0.26
747,550	5.83	0.27			747,550	5.81		0.26
747,900	5.83	0.27			747,900	5.81		0.26
748,250	5.83	0.27			748,250	5.81		0.26
748,600	5.83	0.27			748,600	5.81		0.26
748,950	5.83	0.27			748,950	5.81		0.26
749,300	5.83	0.27			749,300	5.81		0.26
749,650	5.83	0.27			749,650	5.82		0.26
750,000	5.83	0.27			750,000	5.82		0.26
750,350	5.83	0.27			750,350	5.82		0.26
750,700	5.83	0.27			750,700	5.82		0.26
751,050	5.83	0.27			751,050	5.82		0.26
751,400	5.83	0.27			751,400	5.82		0.26
751,750	5.83	0.27			751,750	5.82		0.26
752,100	5.83	0.27			752,100	5.82		0.26
752,450	5.83	0.27			752,450	5.82		0.26
752,800	5.83	0.27			752,800	5.82		0.26
753,150	5.84	0.27			753,150	5.82		0.26
753,500	5.84	0.27			753,500	5.82		0.26
753,850	5.84	0.27			753,850	5.82		0.26
754,200	5.84	0.27			754,200	5.82		0.26
754,550	5.84	0.27			754,550	5.82		0.26
754,900	5.84	0.27			754,900	5.82		0.26
755,250	5.84	0.27			755,250	5.82		0.26
755,600	5.84	0.27			755,600	5.82		0.26

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
755,950	5.84	0.27			755,950	5.82		0.26
756,300	5.84	0.27			756,300	5.82		0.27
756,650	5.84	0.27			756,650	5.82		0.27
757,000	5.84	0.27			757,000	5.83		0.27
757,350	5.84	0.28			757,350	5.83		0.27
757,700	5.84	0.28			757,700	5.83		0.27
758,050	5.84	0.28			758,050	5.83		0.27
758,400	5.84	0.28			758,400	5.83		0.27
758,750	5.84	0.28			758,750	5.83		0.27
759,100	5.84	0.28			759,100	5.83		0.27
759,450	5.84	0.28			759,450	5.83		0.27
759,800	5.84	0.28			759,800	5.83		0.27
760,150	5.84	0.28			760,150	5.83		0.27
760,500	5.85	0.28			760,500	5.83		0.27
760,850	5.85	0.28			760,850	5.83		0.27
761,200	5.85	0.28			761,200	5.83		0.27
761,550	5.85	0.28			761,550	5.83		0.27
761,900	5.85	0.28			761,900	5.83		0.27
762,250	5.85	0.28			762,250	5.83		0.27
762,600	5.85	0.28			762,600	5.83		0.27
762,950	5.85	0.28			762,950	5.83		0.27
763,300	5.85	0.28			763,300	5.83		0.27
763,650	5.85	0.28			763,650	5.83		0.27
764,000	5.85	0.28			764,000	5.84		0.27
764,350	5.85	0.28			764,350	5.84		0.27
764,700	5.85	0.28			764,700	5.84		0.27
765,050	5.85	0.28			765,050	5.84		0.27
765,400	5.85	0.28			765,400	5.84		0.27
765,750	5.85	0.28			765,750	5.84		0.27
766,100	5.85	0.28			766,100	5.84		0.28
766,450	5.85	0.28			766,450	5.84		0.28
766,800	5.85	0.29			766,800	5.84		0.28
767,150	5.85	0.29			767,150	5.84		0.28
767,500	5.85	0.29			767,500	5.84		0.28
767,850	5.86	0.29			767,850	5.84		0.28
768,200	5.86	0.29			768,200	5.84		0.28
768,550	5.86	0.29			768,550	5.84		0.28
768,900	5.86	0.29			768,900	5.84		0.28
769,250	5.86	0.29			769,250	5.84		0.28
769,600	5.86	0.29			769,600	5.84		0.28
769,950	5.86	0.29			769,950	5.84		0.28
770,300	5.86	0.29			770,300	5.84		0.28
770,650	5.86	0.29			770,650	5.84		0.28
771,000	5.86	0.29			771,000	5.84		0.28
771,350	5.86	0.29			771,350	5.85		0.28
771,700	5.86	0.29			771,700	5.85		0.28
772,050	5.86	0.29			772,050	5.85		0.28
772,400	5.86	0.29			772,400	5.85		0.28
772,750	5.86	0.29			772,750	5.85		0.28
773,100	5.86	0.29			773,100	5.85		0.28
773,450	5.86	0.29			773,450	5.85		0.28

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
773,800	5.86	0.29			773,800	5.85		0.28
774,150	5.86	0.29			774,150	5.85		0.28
774,500	5.86	0.29			774,500	5.85		0.28
774,850	5.86	0.29			774,850	5.85		0.28
775,200	5.87	0.29			775,200	5.85		0.28
775,550	5.87	0.29			775,550	5.85		0.29
775,900	5.87	0.29			775,900	5.85		0.29
776,250	5.87	0.29			776,250	5.85		0.29
776,600	5.87	0.30			776,600	5.85		0.29
776,950	5.87	0.30			776,950	5.85		0.29
777,300	5.87	0.30			777,300	5.85		0.29
777,650	5.87	0.30			777,650	5.85		0.29
778,000	5.87	0.30			778,000	5.85		0.29
778,350	5.87	0.30			778,350	5.85		0.29
778,700	5.87	0.30			778,700	5.86		0.29
779,050	5.87	0.30			779,050	5.86		0.29
779,400	5.87	0.30			779,400	5.86		0.29
779,750	5.87	0.30			779,750	5.86		0.29
780,100	5.87	0.30			780,100	5.86		0.29
780,450	5.87	0.30			780,450	5.86		0.29
780,800	5.87	0.30			780,800	5.86		0.29
781,150	5.87	0.30			781,150	5.86		0.29
781,500	5.87	0.30			781,500	5.86		0.29
781,850	5.87	0.30			781,850	5.86		0.29
782,200	5.87	0.30			782,200	5.86		0.29
782,550	5.88	0.30			782,550	5.86		0.29
782,900	5.88	0.30			782,900	5.86		0.29
783,250	5.88	0.30			783,250	5.86		0.29
783,600	5.88	0.30			783,600	5.86		0.29
783,950	5.88	0.30			783,950	5.86		0.29
784,300	5.88	0.30			784,300	5.86		0.29
784,650	5.88	0.30			784,650	5.86		0.29
785,000	5.88	0.30			785,000	5.86		0.29
785,350	5.88	0.30			785,350	5.86		0.30
785,700	5.88	0.30			785,700	5.86		0.30
786,050	5.88	0.30			786,050	5.87		0.30
786,400	5.88	0.31			786,400	5.87		0.30
786,750	5.88	0.31			786,750	5.87		0.30
787,100	5.88	0.31			787,100	5.87		0.30
787,450	5.88	0.31			787,450	5.87		0.30
787,800	5.88	0.31			787,800	5.87		0.30
788,150	5.88	0.31			788,150	5.87		0.30
788,500	5.88	0.31			788,500	5.87		0.30
788,850	5.88	0.31			788,850	5.87		0.30
789,200	5.88	0.31			789,200	5.87		0.30
789,550	5.89	0.31			789,550	5.87		0.30
789,900	5.89	0.31			789,900	5.87		0.30
790,250	5.89	0.31			790,250	5.87		0.30
790,600	5.89	0.31			790,600	5.87		0.30
790,950	5.89	0.31			790,950	5.87		0.30
791,300	5.89	0.31			791,300	5.87		0.30

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
791,650	5.89	0.31			791,650	5.87		0.30
792,000	5.89	0.31			792,000	5.87		0.30
792,350	5.89	0.31			792,350	5.87		0.30
792,700	5.89	0.31			792,700	5.87		0.30
793,050	5.89	0.31			793,050	5.87		0.30
793,400	5.89	0.31			793,400	5.88		0.30
793,750	5.89	0.31			793,750	5.88		0.30
794,100	5.89	0.31			794,100	5.88		0.30
794,450	5.89	0.31			794,450	5.88		0.30
794,800	5.89	0.31			794,800	5.88		0.30
795,150	5.89	0.31			795,150	5.88		0.31
795,500	5.89	0.31			795,500	5.88		0.31
795,850	5.89	0.31			795,850	5.88		0.31
796,200	5.89	0.32			796,200	5.88		0.31
796,550	5.89	0.32			796,550	5.88		0.31
796,900	5.90	0.32			796,900	5.88		0.31
797,250	5.90	0.32			797,250	5.88		0.31
797,600	5.90	0.32			797,600	5.88		0.31
797,950	5.90	0.32			797,950	5.88		0.31
798,300	5.90	0.32			798,300	5.88		0.31
798,650	5.90	0.32			798,650	5.88		0.31
799,000	5.90	0.32			799,000	5.88		0.31
799,350	5.90	0.32			799,350	5.88		0.31
799,700	5.90	0.32			799,700	5.88		0.31
800,050	5.90	0.32			800,050	5.88		0.31
800,400	5.90	0.32			800,400	5.89		0.31
800,750	5.90	0.32			800,750	5.89		0.31
801,100	5.90	0.32			801,100	5.89		0.31
801,450	5.90	0.32			801,450	5.89		0.31
801,800	5.90	0.32			801,800	5.89		0.31
802,150	5.90	0.32			802,150	5.89		0.31
802,500	5.90	0.32			802,500	5.89		0.31
802,850	5.90	0.32			802,850	5.89		0.31
803,200	5.90	0.32			803,200	5.89		0.31
803,550	5.90	0.32			803,550	5.89		0.31
803,900	5.90	0.32			803,900	5.89		0.31
804,250	5.91	0.32			804,250	5.89		0.31
804,600	5.91	0.32			804,600	5.89		0.31
804,950	5.91	0.32			804,950	5.89		0.32
805,300	5.91	0.32			805,300	5.89		0.32
805,650	5.91	0.32			805,650	5.89		0.32
806,000	5.91	0.33			806,000	5.89		0.32
806,350	5.91	0.33			806,350	5.89		0.32
806,700	5.91	0.33			806,700	5.89		0.32
807,050	5.91	0.33			807,050	5.89		0.32
807,400	5.91	0.33			807,400	5.89		0.32
807,750	5.91	0.33			807,750	5.90		0.32
808,100	5.91	0.33			808,100	5.90		0.32
808,450	5.91	0.33			808,450	5.90		0.32
808,800	5.91	0.33			808,800	5.90		0.32
809,150	5.91	0.33			809,150	5.90		0.32

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
809,500	5.91	0.33			809,500	5.90		0.32
809,850	5.91	0.33			809,850	5.90		0.32
810,200	5.91	0.33			810,200	5.90		0.32
810,550	5.91	0.33			810,550	5.90		0.32
810,900	5.91	0.33			810,900	5.90		0.32
811,250	5.91	0.33			811,250	5.90		0.32
811,600	5.92	0.33			811,600	5.90		0.32
811,950	5.92	0.33			811,950	5.90		0.32
812,300	5.92	0.33			812,300	5.90		0.32
812,650	5.92	0.33			812,650	5.90		0.32
813,000	5.92	0.33			813,000	5.90		0.32
813,350	5.92	0.33			813,350	5.90		0.32
813,700	5.92	0.33			813,700	5.90		0.32
814,050	5.92	0.33			814,050	5.90		0.32
814,400	5.92	0.33			814,400	5.90		0.32
814,750	5.92	0.33			814,750	5.90		0.33
815,100	5.92	0.33			815,100	5.91		0.33
815,450	5.92	0.33			815,450	5.91		0.33
815,800	5.92	0.34			815,800	5.91		0.33
816,150	5.92	0.34			816,150	5.91		0.33
816,500	5.92	0.34			816,500	5.91		0.33
816,850	5.92	0.34			816,850	5.91		0.33
817,200	5.92	0.34			817,200	5.91		0.33
817,550	5.92	0.34			817,550	5.91		0.33
817,900	5.92	0.34			817,900	5.91		0.33
818,250	5.92	0.34			818,250	5.91		0.33
818,600	5.92	0.34			818,600	5.91		0.33
818,950	5.93	0.34			818,950	5.91		0.33
819,300	5.93	0.34			819,300	5.91		0.33
819,650	5.93	0.34			819,650	5.91		0.33
820,000	5.93	0.34			820,000	5.91		0.33
820,350	5.93	0.34			820,350	5.91		0.33
820,700	5.93	0.34			820,700	5.91		0.33
821,050	5.93	0.34			821,050	5.91		0.33
821,400	5.93	0.34			821,400	5.91		0.33
821,750	5.93	0.34			821,750	5.91		0.33
822,100	5.93	0.34			822,100	5.91		0.33
822,450	5.93	0.34			822,450	5.92		0.33
822,800	5.93	0.34			822,800	5.92		0.33
823,150	5.93	0.34			823,150	5.92		0.33
823,500	5.93	0.34			823,500	5.92		0.33
823,850	5.93	0.34			823,850	5.92		0.33
824,200	5.93	0.34			824,200	5.92		0.33
824,550	5.93	0.34			824,550	5.92		0.34
824,900	5.93	0.34			824,900	5.92		0.34
825,250	5.93	0.35			825,250	5.92		0.34
825,600	5.93	0.35			825,600	5.92		0.34
825,950	5.94	0.35			825,950	5.92		0.34
826,300	5.94	0.35			826,300	5.92		0.34
826,650	5.94	0.35			826,650	5.92		0.34
827,000	5.94	0.35			827,000	5.92		0.34

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
827,350	5.94	0.35			827,350	5.92		0.34
827,700	5.94	0.35			827,700	5.92		0.34
828,050	5.94	0.35			828,050	5.92		0.34
828,400	5.94	0.35			828,400	5.92		0.34
828,750	5.94	0.35			828,750	5.92		0.34
829,100	5.94	0.35			829,100	5.92		0.34
829,450	5.94	0.35			829,450	5.92		0.34
829,800	5.94	0.35			829,800	5.93		0.34
830,150	5.94	0.35			830,150	5.93		0.34
830,500	5.94	0.35			830,500	5.93		0.34
830,850	5.94	0.35			830,850	5.93		0.34
831,200	5.94	0.35			831,200	5.93		0.34
831,550	5.94	0.35			831,550	5.93		0.34
831,900	5.94	0.35			831,900	5.93		0.34
832,250	5.94	0.35			832,250	5.93		0.34
832,600	5.94	0.35			832,600	5.93		0.34
832,950	5.94	0.35			832,950	5.93		0.34
833,300	5.95	0.35			833,300	5.93		0.34
833,650	5.95	0.35			833,650	5.93		0.34
834,000	5.95	0.35			834,000	5.93		0.35
834,350	5.95	0.35			834,350	5.93		0.35
834,700	5.95	0.35			834,700	5.93		0.35
835,050	5.95	0.36			835,050	5.93		0.35
835,400	5.95	0.36			835,400	5.93		0.35
835,750	5.95	0.36			835,750	5.93		0.35
836,100	5.95	0.36			836,100	5.93		0.35
836,450	5.95	0.36			836,450	5.93		0.35
836,800	5.95	0.36			836,800	5.94		0.35
837,150	5.95	0.36			837,150	5.94		0.35
837,500	5.95	0.36			837,500	5.94		0.35
837,850	5.95	0.36			837,850	5.94		0.35
838,200	5.95	0.36			838,200	5.94		0.35
838,550	5.95	0.36			838,550	5.94		0.35
838,900	5.95	0.36			838,900	5.94		0.35
839,250	5.95	0.36			839,250	5.94		0.35
839,600	5.95	0.36			839,600	5.94		0.35
839,950	5.95	0.36			839,950	5.94		0.35
840,300	5.95	0.36			840,300	5.94		0.35
840,650	5.96	0.36			840,650	5.94		0.35
841,000	5.96	0.36			841,000	5.94		0.35
841,350	5.96	0.36			841,350	5.94		0.35
841,700	5.96	0.36			841,700	5.94		0.35
842,050	5.96	0.36			842,050	5.94		0.35
842,400	5.96	0.36			842,400	5.94		0.35
842,750	5.96	0.36			842,750	5.94		0.35
843,100	5.96	0.36			843,100	5.94		0.35
843,450	5.96	0.36			843,450	5.94		0.35
843,800	5.96	0.36			843,800	5.94		0.36
844,150	5.96	0.36			844,150	5.95		0.36
844,500	5.96	0.36			844,500	5.95		0.36
844,850	5.96	0.37			844,850	5.95		0.36

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
845,200	5.96	0.37			845,200	5.95		0.36
845,550	5.96	0.37			845,550	5.95		0.36
845,900	5.96	0.37			845,900	5.95		0.36
846,250	5.96	0.37			846,250	5.95		0.36
846,600	5.96	0.37			846,600	5.95		0.36
846,950	5.96	0.37			846,950	5.95		0.36
847,300	5.96	0.37			847,300	5.95		0.36
847,650	5.96	0.37			847,650	5.95		0.36
848,000	5.97	0.37			848,000	5.95		0.36
848,350	5.97	0.37			848,350	5.95		0.36
848,700	5.97	0.37			848,700	5.95		0.36
849,050	5.97	0.37			849,050	5.95		0.36
849,400	5.97	0.37			849,400	5.95		0.36
849,750	5.97	0.37			849,750	5.95		0.36
850,100	5.97	0.37			850,100	5.95		0.36
850,450	5.97	0.37			850,450	5.95		0.36
850,800	5.97	0.37			850,800	5.95		0.36
851,150	5.97	0.37			851,150	5.95		0.36
851,500	5.97	0.37			851,500	5.96		0.36
851,850	5.97	0.37			851,850	5.96		0.36
852,200	5.97	0.37			852,200	5.96		0.36
852,550	5.97	0.37			852,550	5.96		0.36
852,900	5.97	0.37			852,900	5.96		0.36
853,250	5.97	0.37			853,250	5.96		0.36
853,600	5.97	0.37			853,600	5.96		0.37
853,950	5.97	0.37			853,950	5.96		0.37
854,300	5.97	0.37			854,300	5.96		0.37
854,650	5.97	0.37			854,650	5.96		0.37
855,000	5.97	0.38			855,000	5.96		0.37
855,350	5.98	0.38			855,350	5.96		0.37
855,700	5.98	0.38			855,700	5.96		0.37
856,050	5.98	0.38			856,050	5.96		0.37
856,400	5.98	0.38			856,400	5.96		0.37
856,750	5.98	0.38			856,750	5.96		0.37
857,100	5.98	0.38			857,100	5.96		0.37
857,450	5.98	0.38			857,450	5.96		0.37
857,800	5.98	0.38			857,800	5.96		0.37
858,150	5.98	0.38			858,150	5.96		0.37
858,500	5.98	0.38			858,500	5.96		0.37
858,850	5.98	0.38			858,850	5.96		0.37
859,200	5.98	0.38			859,200	5.96		0.37
859,550	5.98	0.38			859,550	5.96		0.37
859,900	5.98	0.38			859,900	5.97		0.37
860,250	5.98	0.38			860,250	5.97		0.37
860,600	5.98	0.38			860,600	5.97		0.37
860,950	5.98	0.38			860,950	5.97		0.37
861,300	5.98	0.38			861,300	5.97		0.37
861,650	5.98	0.38			861,650	5.97		0.37
862,000	5.98	0.38			862,000	5.97		0.37
862,350	5.98	0.38			862,350	5.97		0.37
862,700	5.98	0.38			862,700	5.97		0.37

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
863,050	5.98	0.38			863,050	5.97		0.37
863,400	5.98	0.38			863,400	5.97		0.37
863,750	5.98	0.38			863,750	5.97		0.37
864,100	5.98	0.38			864,100	5.97		0.37
864,450	5.98	0.38			864,450	5.97		0.37
864,800	5.99	0.38			864,800	5.97		0.37
865,150	5.99	0.38			865,150	5.97		0.37
865,500	5.99	0.38			865,500	5.97		0.37
865,850	5.99	0.38			865,850	5.97		0.37
866,200	5.99	0.38			866,200	5.97		0.37
866,550	5.99	0.38			866,550	5.97		0.37
866,900	5.99	0.38			866,900	5.97		0.37
867,250	5.99	0.38			867,250	5.97		0.38
867,600	5.99	0.38			867,600	5.97		0.38
867,950	5.99	0.39			867,950	5.97		0.38
868,300	5.99	0.39			868,300	5.98		0.38
868,650	5.99	0.39			868,650	5.98		0.38
869,000	5.99	0.39			869,000	5.98		0.38
869,350	5.99	0.39			869,350	5.98		0.38
869,700	5.99	0.39			869,700	5.98		0.38
870,050	5.99	0.39			870,050	5.98		0.38
870,400	5.99	0.39			870,400	5.98		0.38
870,750	6.00	0.39			870,750	5.98		0.38
871,100	6.00	0.39			871,100	5.98		0.38
871,450	6.00	0.39			871,450	5.98		0.38
871,800	6.00	0.39			871,800	5.98		0.38
872,150	6.00	0.39			872,150	5.98		0.38
872,500	6.00	0.39			872,500	5.98		0.38
872,850	6.00	0.39			872,850	5.99		0.38
873,200	6.00	0.39			873,200	5.99		0.38
873,550	6.00	0.39			873,550	5.99		0.38
873,900	6.00	0.39			873,900	5.99		0.38
874,250	6.00	0.39			874,250	5.99		0.38
874,600	6.00	0.39			874,600	5.99		0.38
874,950	6.00	0.39			874,950	5.99		0.39
875,300	6.00	0.39			875,300	5.99		0.39
875,650	6.00	0.39			875,650	5.99		0.39
876,000	6.00	0.39			876,000	5.99		0.39
876,350	6.00	0.40			876,350	5.99		0.39
876,700	6.00	0.40			876,700	5.99		0.39
877,050	6.00	0.40			877,050	5.99		0.39
877,400	6.01	0.40			877,400	5.99		0.39
877,750	6.01	0.40			877,750	5.99		0.39
878,100	6.01	0.40			878,100	5.99		0.39
878,450	6.01	0.40			878,450	5.99		0.39
878,800	6.01	0.40			878,800	5.99		0.39
879,150	6.01	0.40			879,150	5.99		0.39
879,500	6.01	0.40			879,500	5.99		0.39
879,850	6.01	0.40			879,850	5.99		0.39
880,200	6.01	0.40			880,200	5.99		0.39
880,550	6.01	0.40			880,550	5.99		0.39

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
880,900	6.01	0.40			880,900	5.99		0.39
881,250	6.01	0.40			881,250	5.99		0.39
881,600	6.01	0.40			881,600	5.99		0.39
881,950	6.01	0.40			881,950	6.00		0.39
882,300	6.01	0.40			882,300	6.00		0.39
882,650	6.01	0.40			882,650	6.00		0.39
883,000	6.01	0.40			883,000	6.00		0.39
883,350	6.01	0.40			883,350	6.00		0.39
883,700	6.01	0.40			883,700	6.00		0.39
884,050	6.01	0.40			884,050	6.00		0.39
884,400	6.01	0.40			884,400	6.00		0.39
884,750	6.01	0.40			884,750	6.00		0.39
885,100	6.01	0.40			885,100	6.00		0.39
885,450	6.01	0.40			885,450	6.00		0.39
885,800	6.01	0.40			885,800	6.00		0.39
886,150	6.01	0.40			886,150	6.00		0.39
886,500	6.02	0.40			886,500	6.00		0.39
886,850	6.02	0.40			886,850	6.00		0.39
887,200	6.02	0.40			887,200	6.00		0.39
887,550	6.02	0.40			887,550	6.00		0.39
887,900	6.02	0.40			887,900	6.00		0.39
888,250	6.02	0.40			888,250	6.00		0.39
888,600	6.02	0.40			888,600	6.00		0.39
888,950	6.02	0.40			888,950	6.00		0.40
889,300	6.02	0.40			889,300	6.00		0.40
889,650	6.02	0.40			889,650	6.00		0.40
890,000	6.02	0.40			890,000	6.00		0.40
890,350	6.02	0.41			890,350	6.00		0.40
890,700	6.02	0.41			890,700	6.00		0.40
891,050	6.02	0.41			891,050	6.00		0.40
891,400	6.02	0.41			891,400	6.01		0.40
891,750	6.02	0.41			891,750	6.01		0.40
892,100	6.02	0.41			892,100	6.01		0.40
892,450	6.02	0.41			892,450	6.01		0.40
892,800	6.02	0.41			892,800	6.01		0.40
893,150	6.02	0.41			893,150	6.01		0.40
893,500	6.02	0.41			893,500	6.01		0.40
893,850	6.02	0.41			893,850	6.01		0.40
894,200	6.02	0.41			894,200	6.01		0.40
894,550	6.02	0.41			894,550	6.01		0.40
894,900	6.02	0.41			894,900	6.01		0.40
895,250	6.02	0.41			895,250	6.01		0.40
895,600	6.02	0.41			895,600	6.01		0.40
895,950	6.03	0.41			895,950	6.01		0.40
896,300	6.03	0.41			896,300	6.01		0.40
896,650	6.03	0.41			896,650	6.01		0.40
897,000	6.03	0.41			897,000	6.01		0.40
897,350	6.03	0.41			897,350	6.01		0.40
897,700	6.03	0.41			897,700	6.01		0.40
898,050	6.03	0.41			898,050	6.01		0.40
898,400	6.03	0.41			898,400	6.01		0.40

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
898,750	6.03	0.41			898,750	6.01		0.40
899,100	6.03	0.41			899,100	6.01		0.40
899,450	6.03	0.41			899,450	6.01		0.40
899,800	6.03	0.41			899,800	6.01		0.40
900,150	6.03	0.41			900,150	6.01		0.40
900,500	6.03	0.41			900,500	6.01		0.40
900,850	6.03	0.41			900,850	6.02		0.40
901,200	6.03	0.41			901,200	6.02		0.40
901,550	6.03	0.41			901,550	6.02		0.40
901,900	6.03	0.41			901,900	6.02		0.40
902,250	6.03	0.41			902,250	6.02		0.40
902,600	6.03	0.41			902,600	6.02		0.40
902,950	6.03	0.41			902,950	6.02		0.41
903,300	6.03	0.41			903,300	6.02		0.41
903,650	6.03	0.41			903,650	6.02		0.41
904,000	6.03	0.41			904,000	6.02		0.41
904,350	6.03	0.42			904,350	6.02		0.41
904,700	6.03	0.42			904,700	6.02		0.41
905,050	6.03	0.42			905,050	6.02		0.41
905,400	6.04	0.42			905,400	6.02		0.41
905,750	6.04	0.42			905,750	6.02		0.41
906,100	6.04	0.42			906,100	6.02		0.41
906,450	6.04	0.42			906,450	6.02		0.41
906,800	6.04	0.42			906,800	6.02		0.41
907,150	6.04	0.42			907,150	6.02		0.41
907,500	6.04	0.42			907,500	6.02		0.41
907,850	6.04	0.42			907,850	6.02		0.41
908,200	6.04	0.42			908,200	6.02		0.41
908,550	6.04	0.42			908,550	6.02		0.41
908,900	6.04	0.42			908,900	6.02		0.41
909,250	6.04	0.42			909,250	6.02		0.41
909,600	6.04	0.42			909,600	6.02		0.41
909,950	6.04	0.42			909,950	6.03		0.41
910,300	6.04	0.42			910,300	6.03		0.41
910,650	6.04	0.42			910,650	6.03		0.41
911,000	6.04	0.42			911,000	6.03		0.41
911,350	6.04	0.42			911,350	6.03		0.41
911,700	6.04	0.42			911,700	6.03		0.41
912,050	6.04	0.42			912,050	6.03		0.41
912,400	6.04	0.42			912,400	6.03		0.41
912,750	6.04	0.42			912,750	6.03		0.41
913,100	6.04	0.42			913,100	6.03		0.41
913,450	6.04	0.42			913,450	6.03		0.41
913,800	6.04	0.42			913,800	6.03		0.41
914,150	6.04	0.42			914,150	6.03		0.41
914,500	6.04	0.42			914,500	6.03		0.41
914,850	6.05	0.42			914,850	6.03		0.41
915,200	6.05	0.42			915,200	6.03		0.41
915,550	6.05	0.42			915,550	6.03		0.41
915,900	6.05	0.42			915,900	6.03		0.41
916,250	6.05	0.42			916,250	6.03		0.41

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
916,600	6.05	0.42			916,600	6.03		0.41
916,950	6.05	0.42			916,950	6.03		0.42
917,300	6.05	0.42			917,300	6.03		0.42
917,650	6.05	0.42			917,650	6.03		0.42
918,000	6.05	0.42			918,000	6.03		0.42
918,350	6.05	0.43			918,350	6.03		0.42
918,700	6.05	0.43			918,700	6.03		0.42
919,050	6.05	0.43			919,050	6.03		0.42
919,400	6.05	0.43			919,400	6.04		0.42
919,750	6.05	0.43			919,750	6.04		0.42
920,100	6.05	0.43			920,100	6.04		0.42
920,450	6.05	0.43			920,450	6.04		0.42
920,800	6.05	0.43			920,800	6.04		0.42
921,150	6.05	0.43			921,150	6.04		0.42
921,500	6.05	0.43			921,500	6.04		0.42
921,850	6.05	0.43			921,850	6.04		0.42
922,200	6.05	0.43			922,200	6.04		0.42
922,550	6.05	0.43			922,550	6.04		0.42
922,900	6.05	0.43			922,900	6.04		0.42
923,250	6.05	0.43			923,250	6.04		0.42
923,600	6.05	0.43			923,600	6.04		0.42
923,950	6.05	0.43			923,950	6.04		0.42
924,300	6.06	0.43			924,300	6.04		0.42
924,650	6.06	0.43			924,650	6.04		0.42
925,000	6.06	0.43			925,000	6.04		0.42
925,350	6.06	0.43			925,350	6.04		0.42
925,700	6.06	0.43			925,700	6.04		0.42
926,050	6.06	0.43			926,050	6.04		0.42
926,400	6.06	0.43			926,400	6.04		0.42
926,750	6.06	0.43			926,750	6.04		0.42
927,100	6.06	0.43			927,100	6.04		0.42
927,450	6.06	0.43			927,450	6.04		0.42
927,800	6.06	0.43			927,800	6.04		0.42
928,150	6.06	0.43			928,150	6.04		0.42
928,500	6.06	0.43			928,500	6.04		0.42
928,850	6.06	0.43			928,850	6.05		0.42
929,200	6.06	0.43			929,200	6.05		0.42
929,550	6.06	0.43			929,550	6.05		0.42
929,900	6.06	0.43			929,900	6.05		0.42
930,250	6.06	0.43			930,250	6.05		0.42
930,600	6.06	0.43			930,600	6.05		0.42
930,950	6.06	0.43			930,950	6.05		0.43
931,300	6.06	0.43			931,300	6.05		0.43
931,650	6.06	0.43			931,650	6.05		0.43
932,000	6.06	0.43			932,000	6.05		0.43
932,350	6.06	0.44			932,350	6.05		0.43
932,700	6.06	0.44			932,700	6.05		0.43
933,050	6.06	0.44			933,050	6.05		0.43
933,400	6.06	0.44			933,400	6.05		0.43
933,750	6.07	0.44			933,750	6.05		0.43
934,100	6.07	0.44			934,100	6.05		0.43

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
934,450	6.07	0.44			934,450	6.05		0.43
934,800	6.07	0.44			934,800	6.05		0.43
935,150	6.07	0.44			935,150	6.05		0.43
935,500	6.07	0.44			935,500	6.05		0.43
935,850	6.07	0.44			935,850	6.05		0.43
936,200	6.07	0.44			936,200	6.05		0.43
936,550	6.07	0.44			936,550	6.05		0.43
936,900	6.07	0.44			936,900	6.05		0.43
937,250	6.07	0.44			937,250	6.05		0.43
937,600	6.07	0.44			937,600	6.05		0.43
937,950	6.07	0.44			937,950	6.05		0.43
938,300	6.07	0.44			938,300	6.06		0.43
938,650	6.07	0.44			938,650	6.06		0.43
939,000	6.07	0.44			939,000	6.06		0.43
939,350	6.07	0.44			939,350	6.06		0.43
939,700	6.07	0.44			939,700	6.06		0.43
940,050	6.07	0.44			940,050	6.06		0.43
940,400	6.07	0.44			940,400	6.06		0.43
940,750	6.07	0.44			940,750	6.06		0.43
941,100	6.07	0.44			941,100	6.06		0.43
941,450	6.07	0.44			941,450	6.06		0.43
941,800	6.07	0.44			941,800	6.06		0.43
942,150	6.07	0.44			942,150	6.06		0.43
942,500	6.07	0.44			942,500	6.06		0.43
942,850	6.08	0.44			942,850	6.06		0.43
943,200	6.08	0.44			943,200	6.06		0.43
943,550	6.08	0.44			943,550	6.06		0.43
943,900	6.08	0.44			943,900	6.06		0.43
944,250	6.08	0.44			944,250	6.06		0.43
944,600	6.08	0.44			944,600	6.06		0.43
944,950	6.08	0.44			944,950	6.06		0.44
945,300	6.08	0.44			945,300	6.06		0.44
945,650	6.08	0.44			945,650	6.06		0.44
946,000	6.08	0.44			946,000	6.06		0.44
946,350	6.08	0.45			946,350	6.06		0.44
946,700	6.08	0.45			946,700	6.06		0.44
947,050	6.08	0.45			947,050	6.06		0.44
947,400	6.08	0.45			947,400	6.06		0.44
947,750	6.08	0.45			947,750	6.07		0.44
948,100	6.08	0.45			948,100	6.07		0.44
948,450	6.08	0.45			948,450	6.07		0.44
948,800	6.08	0.45			948,800	6.07		0.44
949,150	6.08	0.45			949,150	6.07		0.44
949,500	6.08	0.45			949,500	6.07		0.44
949,850	6.08	0.45			949,850	6.07		0.44
950,200	6.08	0.45			950,200	6.07		0.44
950,550	6.08	0.45			950,550	6.07		0.44
950,900	6.08	0.45			950,900	6.07		0.44
951,250	6.08	0.45			951,250	6.07		0.44
951,600	6.08	0.45			951,600	6.07		0.44
951,950	6.08	0.45			951,950	6.07		0.44

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
952,300	6.09	0.45			952,300	6.07		0.44
952,650	6.09	0.45			952,650	6.07		0.44
953,000	6.09	0.45			953,000	6.07		0.44
953,350	6.09	0.45			953,350	6.07		0.44
953,700	6.09	0.45			953,700	6.07		0.44
954,050	6.09	0.45			954,050	6.07		0.44
954,400	6.09	0.45			954,400	6.07		0.44
954,750	6.09	0.45			954,750	6.07		0.44
955,100	6.09	0.45			955,100	6.07		0.44
955,450	6.09	0.45			955,450	6.07		0.44
955,800	6.09	0.45			955,800	6.07		0.44
956,150	6.09	0.45			956,150	6.07		0.44
956,500	6.09	0.45			956,500	6.07		0.44
956,850	6.09	0.45			956,850	6.07		0.44
957,200	6.09	0.45			957,200	6.08		0.44
957,550	6.09	0.45			957,550	6.08		0.44
957,900	6.09	0.45			957,900	6.08		0.44
958,250	6.09	0.45			958,250	6.08		0.44
958,600	6.09	0.45			958,600	6.08		0.44
958,950	6.09	0.45			958,950	6.08		0.45
959,300	6.09	0.45			959,300	6.08		0.45
959,650	6.09	0.45			959,650	6.08		0.45
960,000	6.09	0.45			960,000	6.08		0.45
960,350	6.09	0.46			960,350	6.08		0.45
960,700	6.09	0.46			960,700	6.08		0.45
961,050	6.09	0.46			961,050	6.08		0.45
961,400	6.09	0.46			961,400	6.08		0.45
961,750	6.10	0.46			961,750	6.08		0.45
962,100	6.10	0.46			962,100	6.08		0.45
962,450	6.10	0.46			962,450	6.08		0.45
962,800	6.10	0.46			962,800	6.08		0.45
963,150	6.10	0.46			963,150	6.08		0.45
963,500	6.10	0.46			963,500	6.08		0.45
963,850	6.10	0.46			963,850	6.08		0.45
964,200	6.10	0.46			964,200	6.09		0.45
964,550	6.10	0.46			964,550	6.09		0.45
964,900	6.10	0.46			964,900	6.09		0.45
965,250	6.10	0.46			965,250	6.09		0.45
965,600	6.10	0.46			965,600	6.09		0.45
965,950	6.10	0.46			965,950	6.09		0.45
966,300	6.11	0.46			966,300	6.09		0.45
966,650	6.11	0.46			966,650	6.09		0.45
967,000	6.11	0.46			967,000	6.09		0.45
967,350	6.11	0.46			967,350	6.09		0.46
967,700	6.11	0.46			967,700	6.09		0.46
968,050	6.11	0.47			968,050	6.09		0.46
968,400	6.11	0.47			968,400	6.09		0.46
968,750	6.11	0.47			968,750	6.09		0.46
969,100	6.11	0.47			969,100	6.09		0.46
969,450	6.11	0.47			969,450	6.10		0.46
969,800	6.11	0.47			969,800	6.10		0.46

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
970,150	6.11	0.47			*970,150*	6.10		0.46
970,500	6.11	0.47			*970,500*	6.10		0.46
970,850	6.11	0.47			*970,850*	6.10		0.46
971,200	6.11	0.47			*971,200*	6.10		0.46
971,550	6.11	0.47			*971,550*	6.10		0.46
971,900	6.11	0.47			*971,900*	6.10		0.46
972,250	6.11	0.47			*972,250*	6.10		0.46
972,600	6.11	0.47			*972,600*	6.10		0.46
972,950	6.11	0.47			*972,950*	6.10		0.46
973,300	6.11	0.47			*973,300*	6.10		0.46
973,650	6.11	0.47			*973,650*	6.10		0.46
974,000	6.11	0.47			*974,000*	6.10		0.46
974,350	6.12	0.47			*974,350*	6.10		0.46
974,700	6.12	0.47			*974,700*	6.10		0.46
975,050	6.12	0.47			*975,050*	6.10		0.46
975,400	6.12	0.47			*975,400*	6.10		0.46
975,750	6.12	0.47			*975,750*	6.10		0.46
976,100	6.12	0.47			*976,100*	6.10		0.46
976,450	6.12	0.47			*976,450*	6.10		0.46
976,800	6.12	0.47			*976,800*	6.10		0.46
977,150	6.12	0.47			*977,150*	6.10		0.46
977,500	6.12	0.47			*977,500*	6.10		0.46
977,850	6.12	0.47			*977,850*	6.10		0.46
978,200	6.12	0.47			*978,200*	6.10		0.46
978,550	6.12	0.47			*978,550*	6.10		0.46
978,900	6.12	0.47			*978,900*	6.11		0.46
979,250	6.12	0.47			*979,250*	6.11		0.46
979,600	6.12	0.47			*979,600*	6.11		0.46
979,950	6.12	0.47			*979,950*	6.11		0.46
980,300	6.12	0.47			*980,300*	6.11		0.46
980,650	6.12	0.47			*980,650*	6.11		0.46
981,000	6.12	0.47			*981,000*	6.11		0.47
981,350	6.12	0.47			*981,350*	6.11		0.47
981,700	6.12	0.47			*981,700*	6.11		0.47
982,050	6.12	0.47			*982,050*	6.11		0.47
982,400	6.12	0.48			*982,400*	6.11		0.47
982,750	6.12	0.48			*982,750*	6.11		0.47
983,100	6.12	0.48			*983,100*	6.11		0.47
983,450	6.12	0.48			*983,450*	6.11		0.47
983,800	6.13	0.48			*983,800*	6.11		0.47
984,150	6.13	0.48			*984,150*	6.11		0.47
984,500	6.13	0.48			*984,500*	6.11		0.47
984,850	6.13	0.48			*984,850*	6.11		0.47
985,200	6.13	0.48			*985,200*	6.11		0.47
985,550	6.13	0.48			*985,550*	6.11		0.47
985,900	6.13	0.48			*985,900*	6.11		0.47
986,250	6.13	0.48			*986,250*	6.11		0.47
986,600	6.13	0.48			*986,600*	6.11		0.47
986,950	6.13	0.48			*986,950*	6.11		0.47
987,300	6.13	0.48			*987,300*	6.11		0.47
987,650	6.13	0.48			*987,650*	6.11		0.47

Time (sec)	Pump A	Pump A	Pump B		Time (sec)	Pump B	Pump C	Pump D
988,000	6.13	0.48			***988,000***	6.11		0.47
988,350	6.13	0.48			***988,350***	6.12		0.47
988,700	6.13	0.48			***988,700***	6.12		0.47
989,050	6.13	0.48			***989,050***	6.12		0.47
989,400	6.13	0.48			***989,400***	6.12		0.47
989,750	6.13	0.48			***989,750***	6.12		0.47
990,100	6.13	0.48			***990,100***	6.12		0.47
990,450	6.13	0.48			***990,450***	6.12		0.47
990,800	6.13	0.48			***990,800***	6.12		0.47
991,150	6.13	0.48			***991,150***	6.12		0.47
991,500	6.13	0.48			***991,500***	6.12		0.47
991,850	6.13	0.48			***991,850***	6.12		0.47
992,200	6.13	0.48			***992,200***	6.12		0.47
992,550	6.13	0.48			***992,550***	6.12		0.47
992,900	6.13	0.48			***992,900***	6.12		0.47
993,250	6.14	0.48			***993,250***	6.12		0.47
993,600	6.14	0.48			***993,600***	6.12		0.47
993,950	6.14	0.48			***993,950***	6.12		0.47
994,300	6.14	0.48			***994,300***	6.12		0.47
994,650	6.14	0.48			***994,650***	6.12		0.47
995,000	6.14	0.48			***995,000***	6.12		0.48
995,350	6.14	0.48			***995,350***	6.12		0.48
995,700	6.14	0.48			***995,700***	6.12		0.48
996,050	6.14	0.48			***996,050***	6.12		0.48
996,400	6.14	0.49			***996,400***	6.12		0.48
996,750	6.14	0.49			***996,750***	6.12		0.48
997,100	6.14	0.49			***997,100***	6.12		0.48
997,450	6.14	0.49			***997,450***	6.12		0.48
997,800	6.14	0.49			***997,800***	6.13		0.48
998,150	6.14	0.49			***998,150***	6.13		0.48
998,500	6.14	0.49			***998,500***	6.13		0.48
998,850	6.14	0.49			***998,850***	6.13		0.48
999,200	6.14	0.49			***999,200***	6.13		0.48
999,550	6.14	0.49			***999,550***	6.13		0.48
999,900	6.14	0.49			***999,900***	6.13		0.48
Min ->	5.79	0.24			***Min ->***	5.77		0.23