D.M. JAMIL
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July 28, 2005

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

Subject: Duke Energy Corporation
Catawba Nuclear Station, Units 1 and 2
Docket Numbers 50-413 and 50-414
Proposed Change to Technical Specification (TS) 3.7.9, Standby Nuclear Service Water Pond (SNSWP)

Reference: 1. Letter from D.M. Jamil to NRC, same subject, dated July 25, 2005

Reference 1 submitted a proposed revision to the temperature limit for the Catawba SNSWP. This proposed TS amendment was submitted on an emergency basis.

On July 26, 2005, the NRC electronically transmitted a Request for Additional Information (RAI) to Catawba. The purpose of this letter is to reply to this RAI. Attachment 1 to this letter contains our reply. The format of the reply is to restate each RAI question, followed by our response.

The No Significant Hazards Consideration Determination and Environmental Analysis transmitted in Reference 1 continue to remain valid as a result of this reply.

Pursuant to 10 CFR 50.91, a copy of this reply is being sent to the appropriate State of South Carolina official.

Should you have any questions concerning this information, please call L.J. Rudy at (803) 831-3084.

A001

Catawba Nuclear Station 20th Anniversary 1985-2005

Very truly yours,

D.M. Jamil

Attachment

LJR/s

D.M. Jamil affirms that he is the person who subscribed his name to the foregoing statement, and that all the matters and facts set forth herein are true and correct to the best of his knowledge.

D.M. Jamil, Site Vice President

Subscribed and sworn to me: 7-28-2005
Date

Mickey Standridge
Notary Public

My commission expires: 7-10-2012
Date

SEAL

xc (with attachment):

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ATTACHMENT 1

REPLY TO NRC REQUEST FOR ADDITIONAL INFORMATION

Containment and Dose

1. Page 10 of the July 25, 2005 submittal states that the UFSAR maximum credible sump temperature is 190 F for a hot leg break. Figure 6-9 of the Catawba UFSAR shows higher sump temperatures for a cold leg pump discharge break. Does the 190 F refer to the highest sump temperature after recirculation?

Duke Energy Corporation Response:

Yes, the calculated sump temperature is only a concern once the ECCS pump suction valves to the sump are opened. The ECCS suction valves to the sump open upon receipt of the refueling water storage tank lo-level alarm. At this point in time, the hot leg break case provides a higher sump temperature. Since the effect of increasing the NSWS temperature impacts the ECCS injection temperature only after realigning ECCS pump suction to the sump, the current analysis results demonstrate that the 190ºF limit is not challenged.

Plant Systems

1. Additional information is required in order to demonstrate that the current situation could not have been reasonably anticipated such that an emergency situation pursuant to 10 CFR 50.91(a)(5) exists. Please provide a graphical representation of how the standby nuclear service water pond (SNSWP) temperatures have trended over time (24-hour running average and instantaneous operator/computer values) for the worst two week period of each year since June 1995 to the present, and explain why this information would not cause you to anticipate the elevated SNSWP temperatures that are currently being experienced.

Duke Energy Corporation Response:

The attached graphs in Enclosure 1 depict how SNSWP temperatures have trended over time during the months of July and August (which includes the worst two-week period of each year for the years 1996 through 2005). There is one graph for each year for 1996 through 2005. The years were chosen to provide a comparison based on the same SNSWP elevation, since elevation can affect measured SNSWP temperature, and elevation was increased to 574 feet in

1996. These graphs utilize 5-minute average data from the Operator Aid Computer (OAC). In addition to graphs for each year, there is also a graph which compares 2005 temperatures with the historical minimum, maximum, and average temperatures for the years 1996 through 2004.

The data in Enclosure 1 indicates short term spikes of up to 89ºF during the hot summer months. In the 20 plus years of operating history, there has never been a forced shutdown of a Catawba unit due to SNSWP temperature. Therefore, there was no reason, based on historical data, to anticipate the need for an emergency TS change. However, Catawba did identify the need for additional operating margin in case the historical weather patterns became more challenging. Catawba has been working on the analysis to support this amendment for several months prior to the submittal. Beginning several weeks ago, Catawba began experiencing an extended stretch of hot, humid weather that resulted in an upward trend in SNSWP temperature of approximately 0.4ºF per day and increasing Lake Wylie temperatures. Catawba has also historically experienced short term spikes of up to 3ºF due to late afternoon rain shower runoff, where the runoff picks up heat from the SNSWP surroundings. Based on the trend, the potential rain runoff concern, and predictions of continued hot and humid weather, Catawba management decided it was prudent to expedite the completion of all required analysis to support raising the SNSWP temperature limit and to submit an emergency TS amendment. In the meantime, Catawba has been aggressively making up to the SNSWP during times of relatively low Lake Wylie inlet temperature in an effort to slow the upward trend in SNSWP temperature. These efforts have slowed the rate of increase of SNSWP temperature. Temperature reached 88.4ºF on July 27, 2005. These measures will not be effective indefinitely without a break in the weather. Therefore, continued SNSWP temperature increases over the next few days, and/or a short term temperature spike, could result in exceeding the existing TS limit.

2. Please explain how measurement uncertainties are accounted for when confirming that the ultimate heat sink temperature limit as specified in the Technical Specifications is satisfied.

Duke Energy Corporation Response:

The temperature loop measurement uncertainty for the SNSWP has been documented in calculation CNC-1210.04-00-0067, Rev. 1. The appropriate uncertainty has been applied to Catawba surveillance procedures utilized in determining the temperature of the SNSWP. For measurements observed on the plant OAC, the uncertainty applied is 1.1ºF (e.g., in order to remain below the present TS temperature limit of 91.5ºF, the temperature as observed on the OAC must remain below 90.4ºF). In addition to observing SNSWP temperature on the OAC, local temperature readings may be taken at the SNSWP at elevation 568 feet using a hand held pyrometer. The uncertainty associated with pyrometer readings is 0.1ºF, and this uncertainty has been accounted for in surveillance procedures.

3. The proposed changes to the TS Bases on Page B3.7.9-1, the paragraph after Insert 1, indicates that the basis for 95 °F is to ensure that containment spray and component cooling water heat exchanger temperature assumptions are not exceeded consistent with the peak containment pressure analysis, and to ensure that the long-term nuclear service water system (NSWS) temperature does not exceed the 100 °F design basis of the NSWS components. This is inconsistent with the information provided in Insert 1 which indicates that the temperature limit is based on satisfying reactor cooldown assumptions so that offsite dose requirements will continue to be satisfied. Similarly for the TS Bases discussion on TS Bases Page B 3.7.9-2, under the LCO section. Please correct the TS Bases to resolve this inconsistency and to properly reflect the basis for the proposed 95 °F ultimate heat sink temperature limit.

Duke Energy Corporation Response:

Duke Energy Corporation has evaluated this question and the subject Bases Applicable Safety Analyses section has been clarified to address the NRC concern. Enclosure 2 contains the revised Bases marked-up and reprinted pages. Based on the revised material for the Applicable Safety Analyses section, no additional changes are necessary to the LCO section in response to this question.

4. TS Bases Page B3.7.9-2 indicates that in order to ensure that the NSWS initial temperature assumptions in the limiting analysis are met, at least one train of containment spray must be configured to be cooled by a

loop of the NSWS that is aligned to the SNSWP when Lake Wylie exceeds the specified temperature limit. Please explain why it is not necessary to configure both containment spray trains in the noted configuration in light of potential single active failure considerations and TS operability requirements.

Duke Energy Corporation Response:

Catawba procedures have been reviewed and all relevant procedures indeed require both trains of containment spray to be configured to be cooled by a loop of the NSWS that is aligned to the SNSWP when Lake Wylie exceeds the specified temperature limit. The Bases for TS 3.7.9 are revised to reflect this requirement. (This item has been addressed via the reply to Question 3.)

5. Evaluation of the time it will take to cool the reactor coolant system down to 210 °F following a main steam line break assuming a NSWS temperature of 95.5 °F was determined to be 18.8 hours; whereas the previous evaluation determined that it would take 31.2 hours. The submittal indicates that this reduction in time is due to the fewer number of plugged tubes that are assumed to exist in the component cooling water heat exchanger. Please identify: (a) how much time it takes to cool the reactor coolant system down to 350 °F, and explain any differences that exist between the two analyses in this regard; (b) what initial NSWS temperature was assumed for the current (31.2 hour) analysis and how this temperature was assumed to vary over time and the basis for the approach that was used; and (c) confirm that except for the initial NSWS temperature that is assumed and the number of tubes that are assumed to be plugged in the component cooling heat exchanger, the revised analysis is exactly the same as the one that was completed previously in all other respects; otherwise, identify any other differences that exist along with the necessary justification.

Duke Energy Corporation Response:

a) Per calculation CNC-1201.30-00-0027, Rev. 1, (Determination of NC System Cooldown Time Following a Main Steam Line Break), the time to cool the Reactor Coolant System down to 350ºF is 4.54 hours. As determined by Rev. 0 of this calculation, the time to cool the Reactor Coolant System down to 350ºF was 4.14

hours. The time difference is attributable to the assumption of how many reactor coolant pumps were in service above 350ºF. The only difference between the two analyses for a Reactor Coolant System temperature of 350ºF or greater was that Rev. 0 assumed no reactor coolant pumps in service while Rev. 1 assumed three reactor coolant pumps in service.

(b) Rev. 0 of calculation CNC-1201.30-00-0027 used an initial NSWS temperature of 92ºF and assumed this same temperature for 31.2 hours. This assumption is supported by Rev. 15 of calculation CNC-1150.01-00-0001 (SNSWP Thermal Analysis during One Unit Loss of Coolant Accident with One Unit Shutdown), which shows that the intake temperature does not exceed 92ºF until much greater than 31.2 hours.

(c) Rev. 0 and Rev. 1 of calculation CNC-1201.30-00-0027 incorporate the same methodology and assumptions, except for initial SNSWP temperature (92ºF versus 95.5ºF), and the number of tubes plugged in the Component Cooling Water System heat exchanger (865 tubes plugged versus 400 tubes plugged).

6. Attachment 3, Page 7, of the submittal states that the reanalysis for determining the plant intake temperature was performed in accordance with the NRC Safety Evaluation for the Catawba SNSWP analysis model (letter from Peter S. Tam to William R. McCollum dated November 19, 1996).

    (a) The staff's evaluation (Page 8) indicates that the licensee's fully stratified model (Baker, 1995a) does not account for the uneven distribution of heat and water to the two legs of the pond. Consistent with the staff's assessment on Page 9 of the evaluation, Sections 2.12 and 2.13, please explain how degraded pond performance was accounted for in demonstrating that the limiting temperature of 100 °F will not be exceeded. Note that for the existing temperature limits, the staff concluded that for the degraded case, using the fully stratified model, the maximum temperature was predicted to be 100.0 °F.

Duke Energy Corporation Response:

The RAI states that "the licensee's fully stratified model does not account for the uneven distribution of heat and water to the two legs of the pond." Pond analyses prepared by Duke Energy Corporation demonstrate that the heated discharge water is distributed evenly over the surface of the entire pond even during scenarios in which there is an uneven flow distribution to the two arms of the pond. The SNSWP calculation (CNC-1150.01-00-0001) provides a rigorous hydraulic analysis of this phenomenon including:

- A computation of the surface buoyancy of the heated discharge layer demonstrating that the pond will exhibit minimal vertical mixing of the heated plume and that the heated plume will remain on the surface.
- An evaluation of nearfield mixing, concluding that the limited mechanical mixing induced at the discharge structure will not disrupt the vertical stratification beyond the immediate vicinity of the discharge, thereby allowing for utilization of the full pond for surface cooling.

In addition to the extensive theoretical hydraulic evaluation and engineering calculations referenced above, thermal/dye tracer tests were performed on the Catawba SNSWP in 1995. During these tests, heated water and dye were discharged from the short leg discharge structure. These tests demonstrated that the heated water spread out over most of the pond surface, including the long leg, despite the fact that no heated water or dye was being discharged from the long leg discharge structure. In reference to these tests, Section 2.9.1 of the November 19, 1996 letter from Peter S. Tam (NRC) to William R. McCollum (Duke), states, "These tests lend support to the licensee's model of a stratified pond, and diminishes the potential detrimental effects of an uneven flow split between the two thermal outfalls."

The extensive theoretical analysis of the SNSWP, along with the physical testing, clearly supports the use of a stratified model where the full surface area is effective in heat dissipation regardless of the relative flow distribution to the two discharge structures. Consequently, a pond analysis for a "degraded case" is not appropriate for the Catawba pond.

(b) The assessment that was provided in Attachment 3, Page 5, of the submittal discusses the basis for assuming a constant intake temperature for at least 18.8 hours. The assessment that was provided is not consistent with the analysis that was completed previously and does not address all of the considerations discussed in the staff's evaluation (Page 2, Section 2.1). Please supplement the assessment to fully justify the use of a constant intake temperature for 18.8 hours based on the results of engineering calculations for stable stratified conditions in the pond during the initial 18.8 hour period.

Duke Energy Corporation Response:

The assessment that was provided in Attachment 3, Page 5, of the July 25, 2005 submittal assumed a constant intake temperature for at least 18.8 hours, in order to meet the Reactor Coolant System cooldown requirements following a Main Steam Line Break (calculation CNC-1201.30-00-0027). On the other hand, the analysis that was completed previously (and discussed in the staff's evaluation, Page 2, Section 2.1, of the November 19, 1996 NRC Safety Evaluation) assumed a constant intake temperature for at least 12.5 hours, in order meet an assumption used in the original Westinghouse LOTIC containment analysis. However, since Duke Energy Corporation has replaced the Westinghouse LOTIC analysis with its in-house GOTHIC analysis, this assumption is no longer required. As stated in calculation CNC-1552.08-00-0314, Rev. 2 (Large-Break LOCA Containment Response with Asymmetric Initial Ice Distribution): "These GOTHIC analyses replace any older Westinghouse containment analyses which assumed a maximum RN temperature of 92 deg F during the first 12.5 hours of the transient. The methodology presented in Reference 2 replaces any Westinghouse containment analyses."

7. Please confirm that the effects of the proposed increase in temperature of the ultimate heat sink, NSWS supply to the containment spray heat exchanger, and NSWS supply to the component cooling water heat exchanger on component thermal stresses and pipe support loads have been evaluated and found to be within the applicable acceptance criteria.

Duke Energy Corporation Response:

The proposed increase in SNSWP temperature from 91.5ºF to 95ºF is bounded by current NSWS piping design temperatures.

The NSWS supply piping is designed for greater than or equal to 100ºF temperatures. The outlet piping on heat exchangers cooled by the NSWS has been analyzed for worst case heat load conditions, including the higher ultimate heat sink temperature, and was found to meet the applicable piping and support design criteria as required by Catawba UFSAR Section 3.9.3, "ASME Code Class 1, 2 and 3 Components, Component Supports and Core Support Structures." The supporting analyses are documented in approved Catawba piping analyses and heat transfer calculations.

8. Please describe measures that have been taken to update the SNSWP model (Baker, 1995a) to accurately reflect the additional meteorological data that has been recorded after the model was originally developed, and explain how the original analysis is affected by incorporating this additional data.

Duke Energy Corporation Response:

A formal, comprehensive review of the meteorological data was conducted in 1996 utilizing 45 years of meteorological data (January 1950 - December 1995). This review was documented in the SNSWP calculation CNC-1150.01-00-0001. Since that time, informal evaluations of the meteorological data have been conducted on a non-routine basis. The last review included meteorological data from 1995 through 2002. This review did not reveal a meteorological period which was worse than the period identified in the prior analysis. Consequently, no formal documentation of this review has been prepared. Although an analysis of meteorological data has not been performed on data from 2003 through the present, consultation with Duke Energy Corporation meteorologists indicates that no periods of historically extreme meteorology have occurred in this interval. Thus, based on the above, Duke Energy Corporation is confident that the worst case meteorology modeled in the SNSWP calculation is bounding.

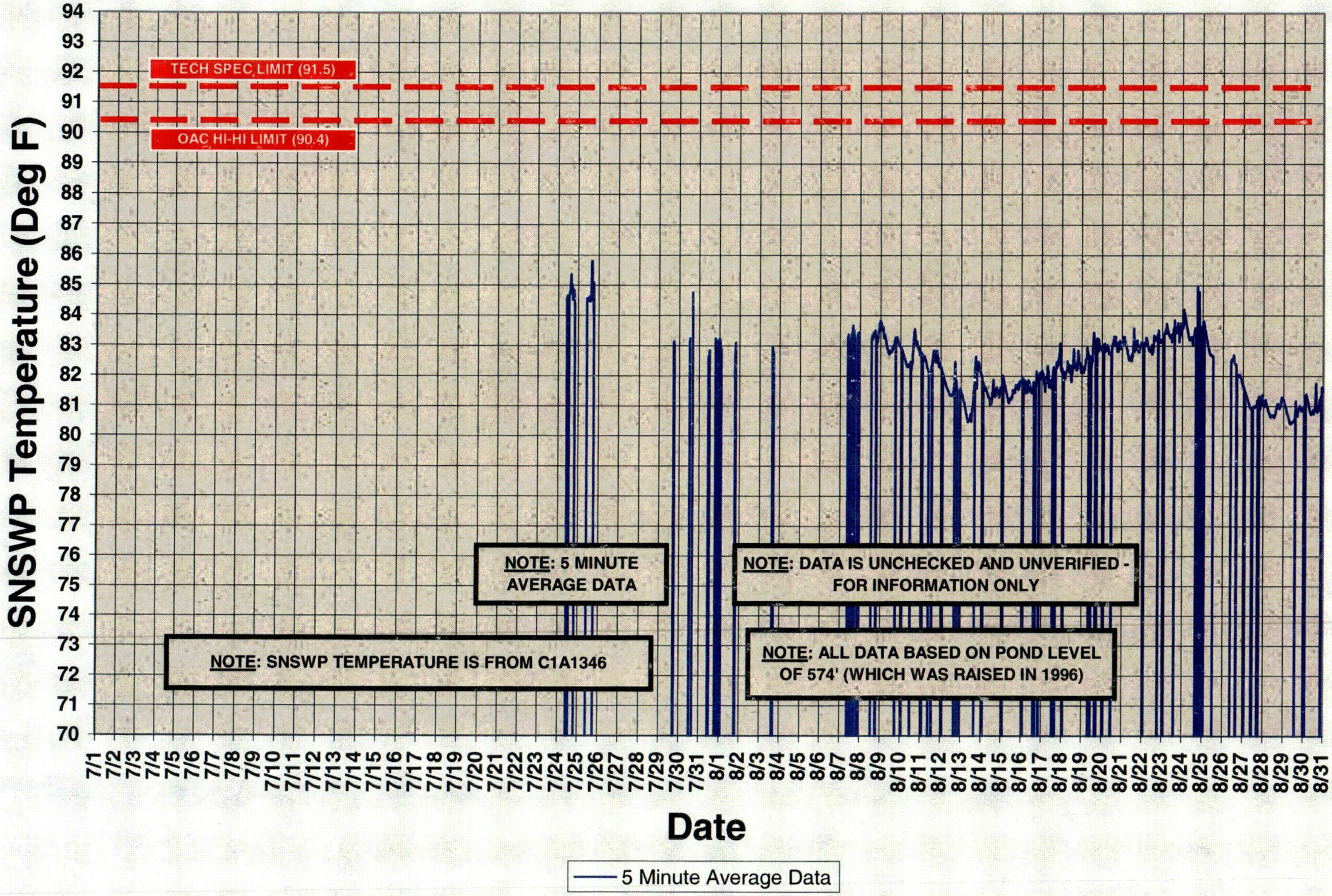
ENCLOSURE 1

SNSWP TEMPERATURE TRENDS

Catawba Nuclear Station

1996 Pond Temperature

(updated 07/27/05 by Norman Stambaugh)

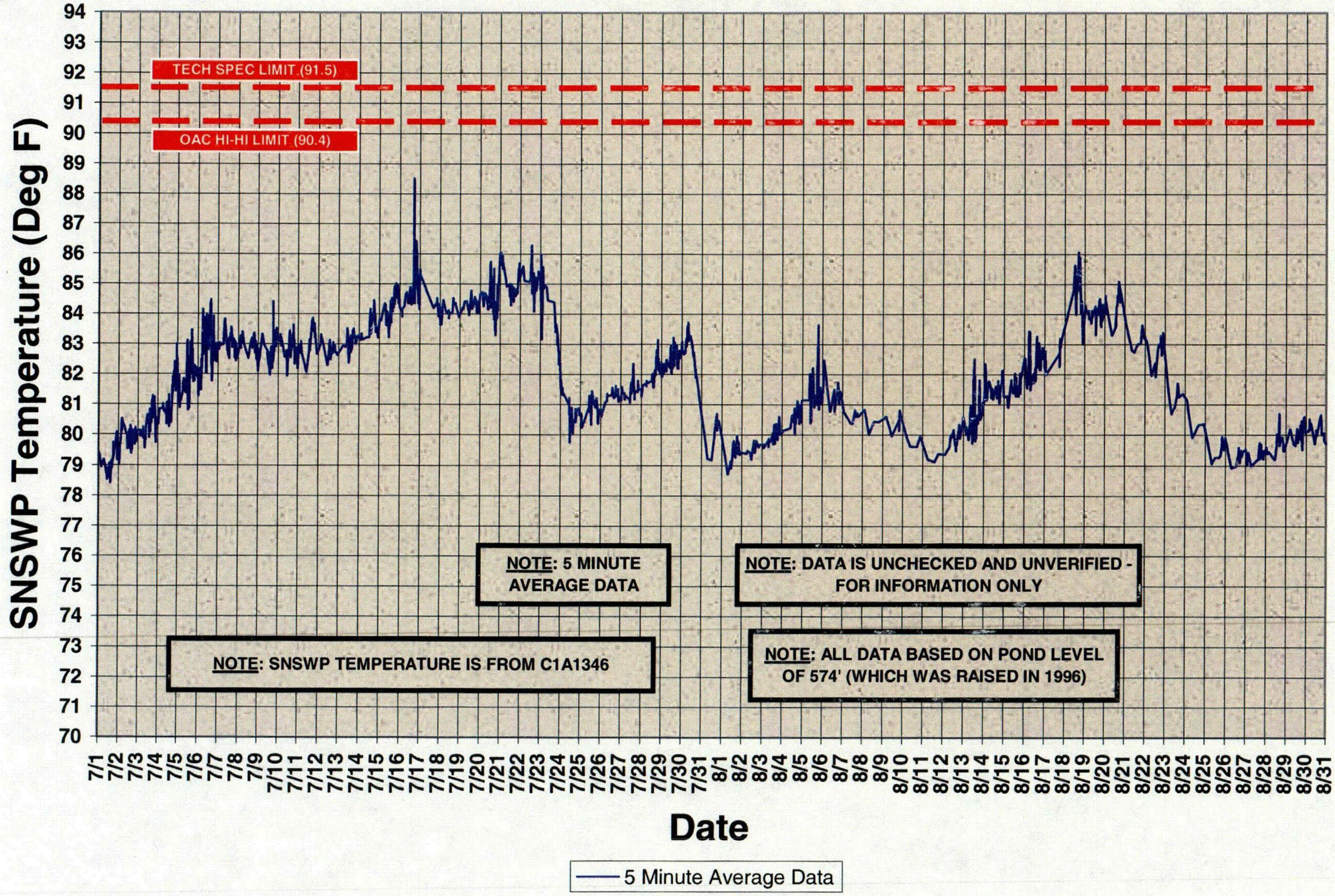


C01

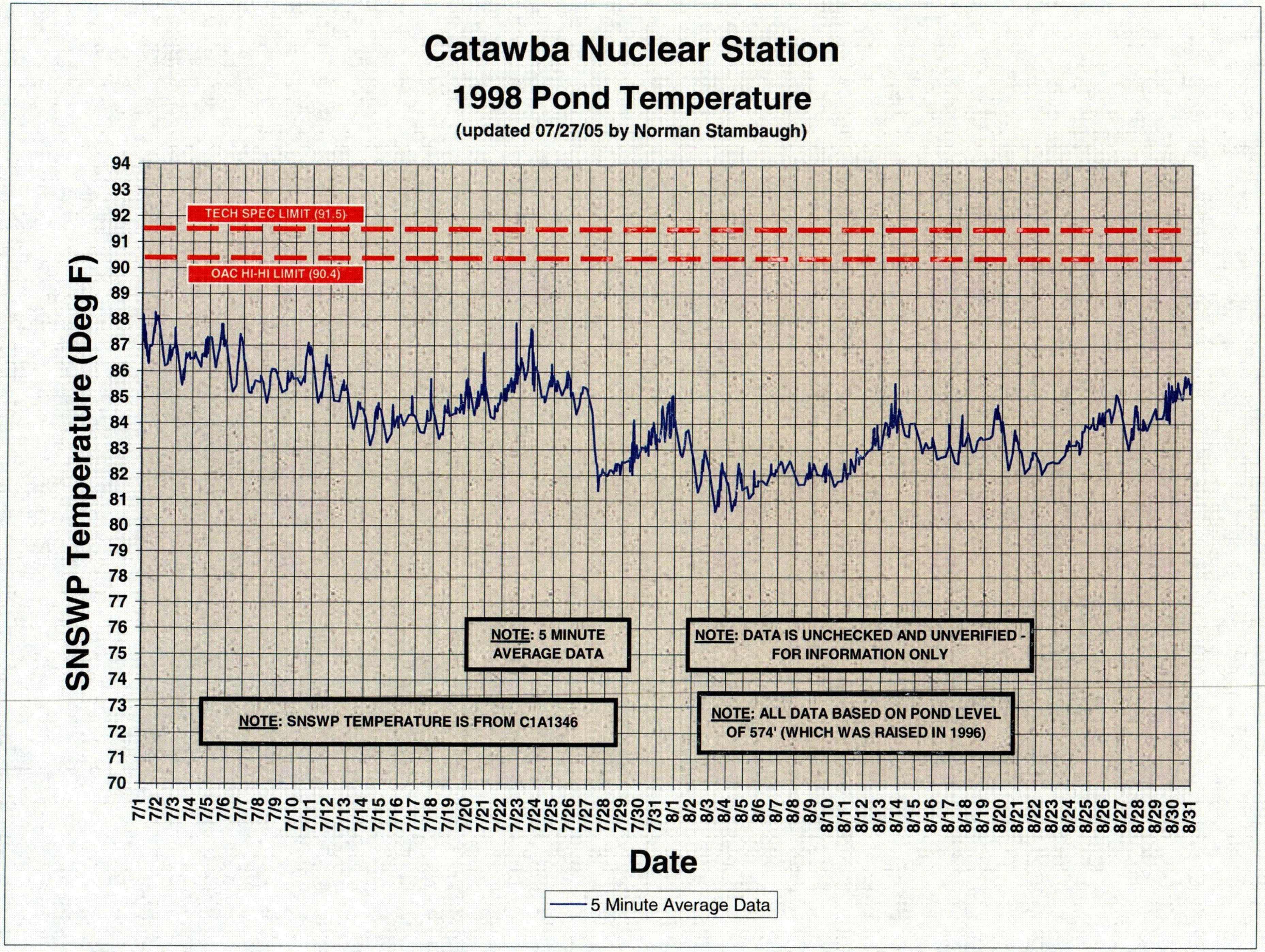
Catawba Nuclear Station

1997 Pond Temperature

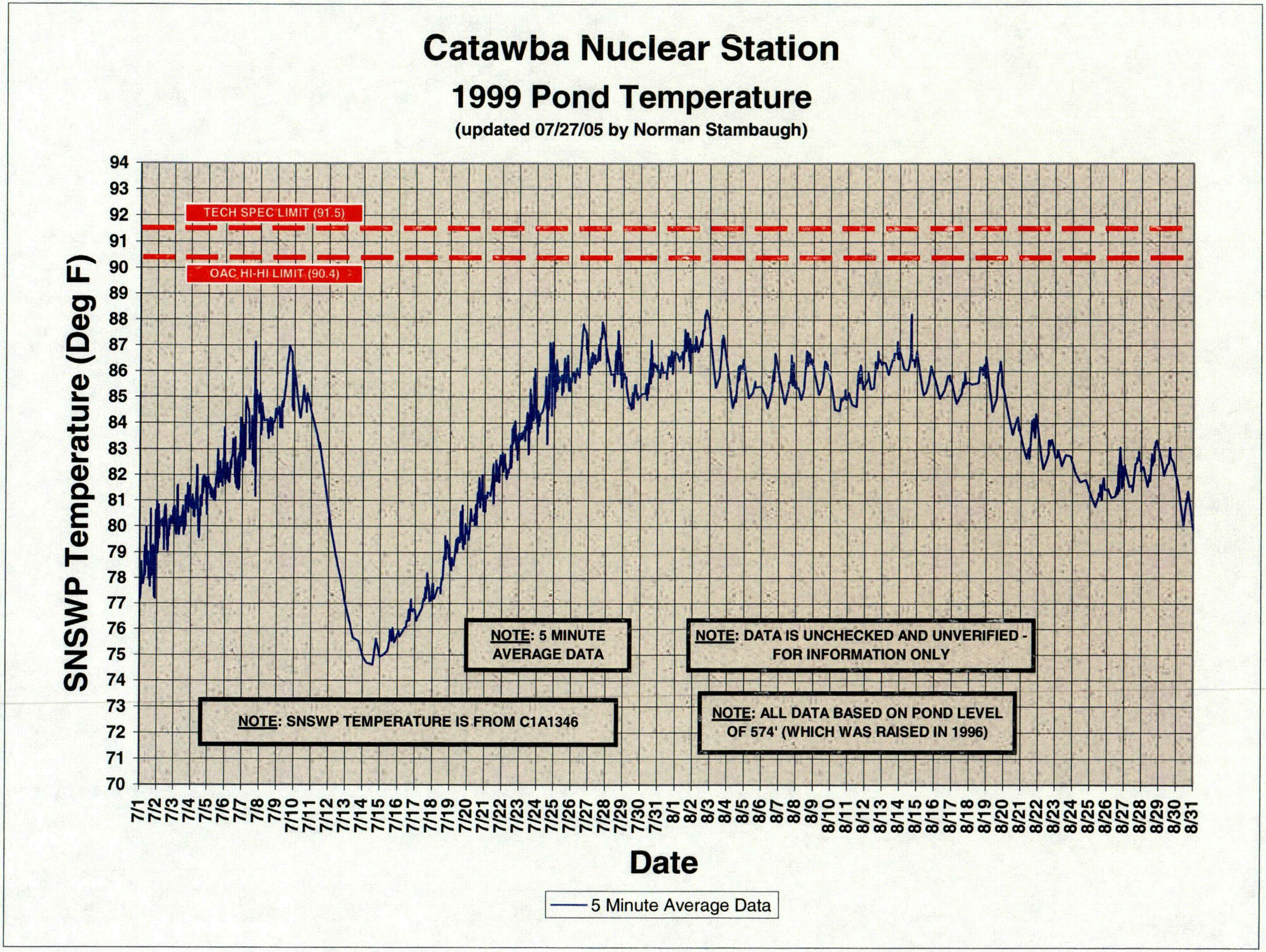
(updated 07/27/05 by Norman Stambaugh)



C02

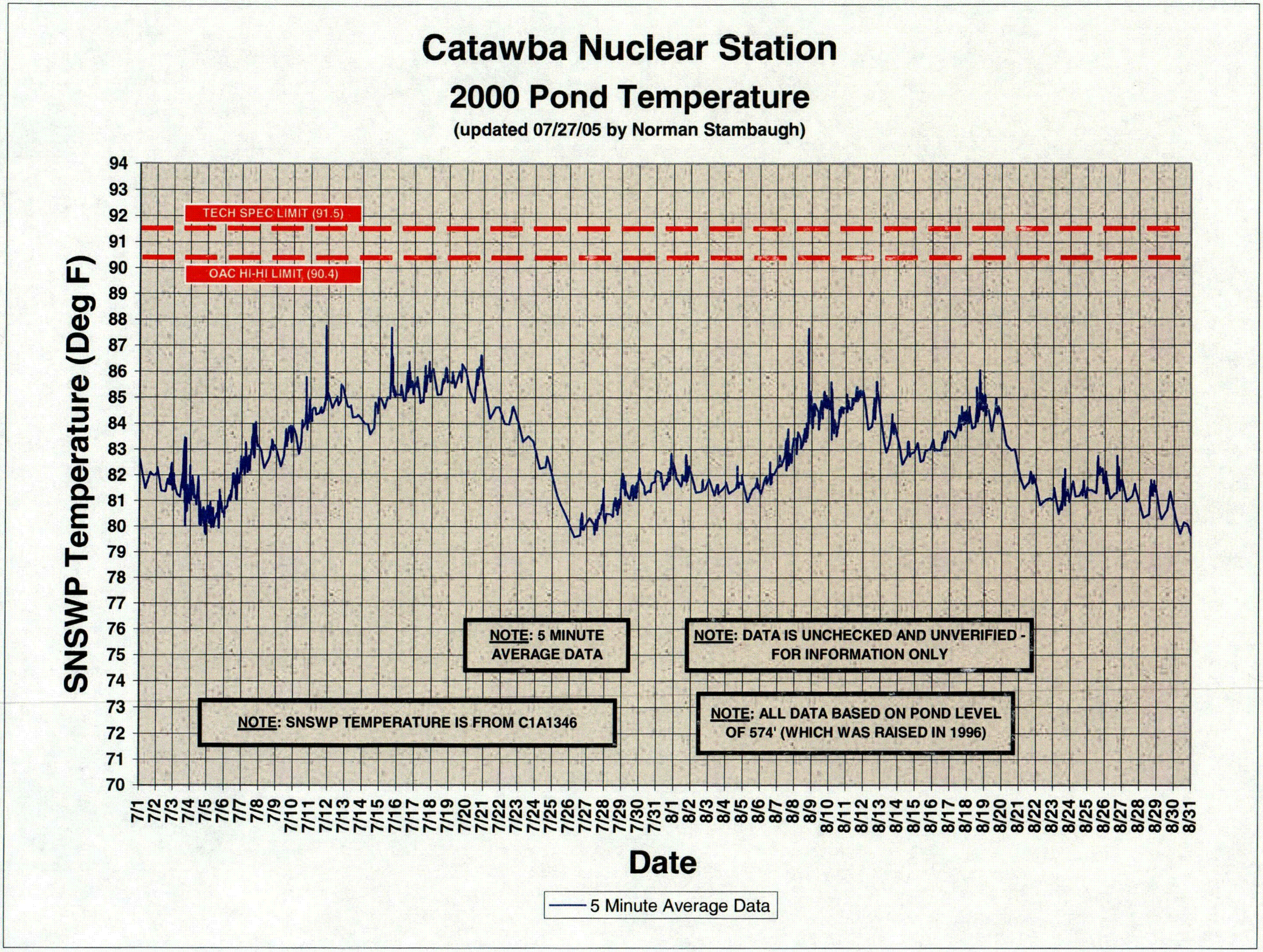

Catawba Nuclear Station
1998 Pond Temperature
(updated 07/27/05 by Norman Stambaugh)
SNSWP Temperature (Deg F)
TECH SPEC LIMIT (91.5)
OAC HI-HI LIMIT (90.4)
NOTE: 5 MINUTE AVERAGE DATA
NOTE: DATA IS UNCHECKED AND UNVERIFIED - FOR INFORMATION ONLY
NOTE: SNSWP TEMPERATURE IS FROM C1A1346
NOTE: ALL DATA BASED ON POND LEVEL OF 574' (WHICH WAS RAISED IN 1996)
Date
5 Minute Average Data

C03



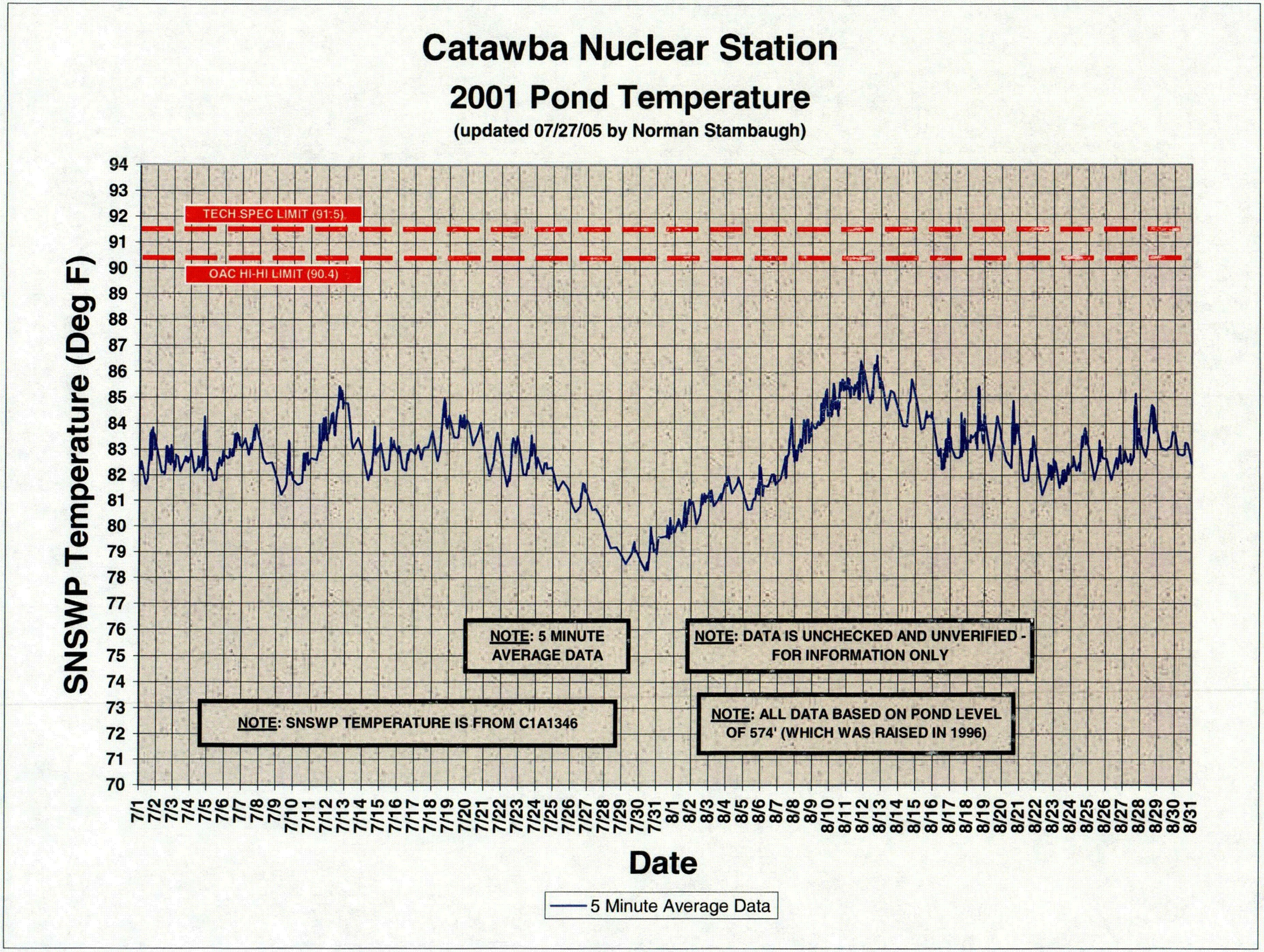
Catawba Nuclear Station
1999 Pond Temperature
(updated 07/27/05 by Norman Stambaugh)
TECH SPEC LIMIT (91.5)
OAC HI-HI LIMIT (90.4)
SNSWP Temperature (Deg F)
NOTE: 5 MINUTE AVERAGE DATA
NOTE: DATA IS UNCHECKED AND UNVERIFIED - FOR INFORMATION ONLY
NOTE: SNSWP TEMPERATURE IS FROM C1A1346
NOTE: ALL DATA BASED ON POND LEVEL OF 574' (WHICH WAS RAISED IN 1996)
Date
5 Minute Average Data

C04



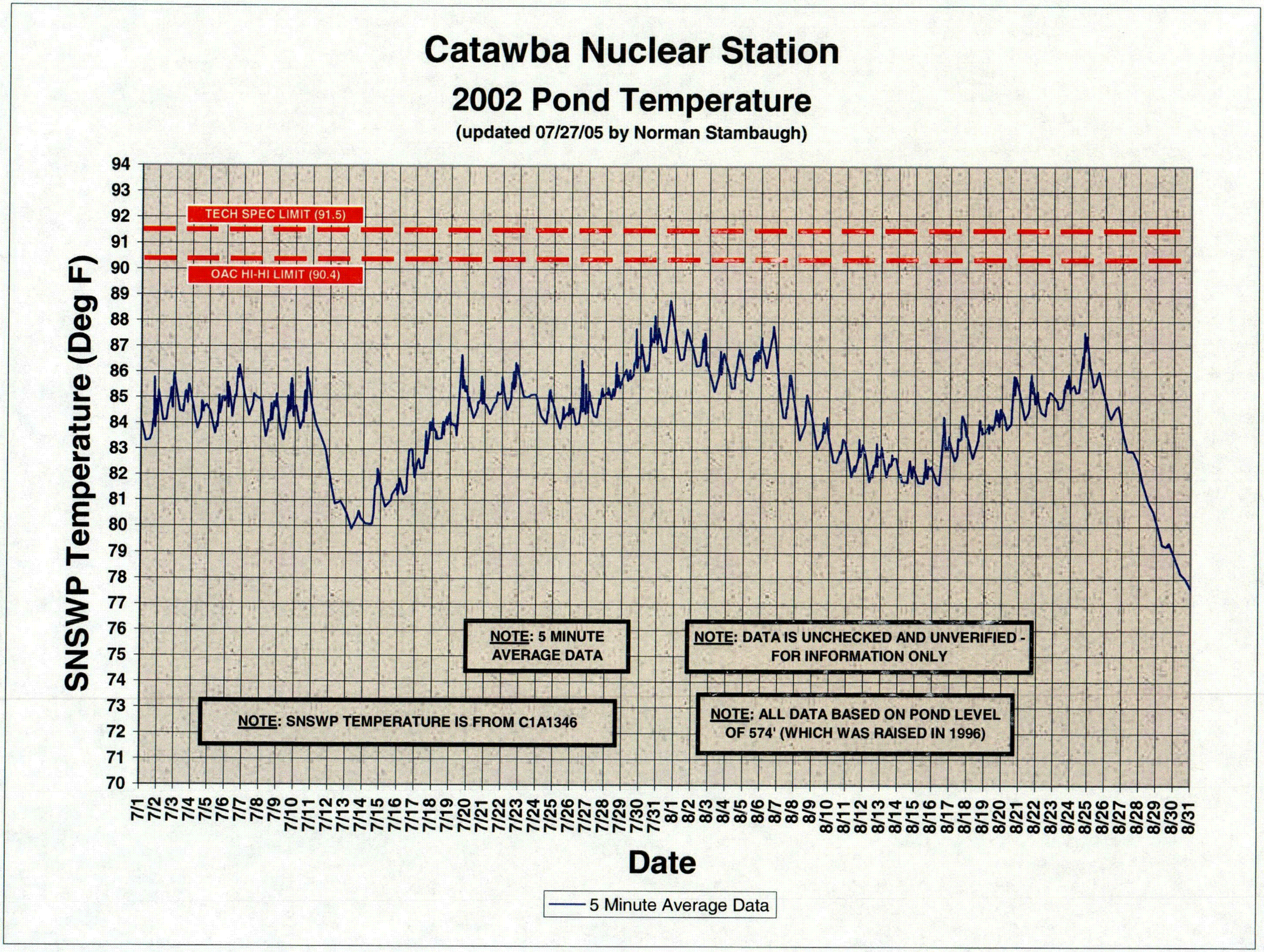
Catawba Nuclear Station
2000 Pond Temperature
(updated 07/27/05 by Norman Stambaugh)
SNSWP Temperature (Deg F)
TECH SPEC LIMIT (91.5)
OAC HI-HI LIMIT (90.4)
NOTE: 5 MINUTE AVERAGE DATA
NOTE: DATA IS UNCHECKED AND UNVERIFIED - FOR INFORMATION ONLY
NOTE: SNSWP TEMPERATURE IS FROM C1A1346
NOTE: ALL DATA BASED ON POND LEVEL OF 574' (WHICH WAS RAISED IN 1996)
Date
5 Minute Average Data

C05



Catawba Nuclear Station
2001 Pond Temperature
(updated 07/27/05 by Norman Stambaugh)
TECH SPEC LIMIT (91.5)
OAC HI-HI LIMIT (90.4)
SNSWP Temperature (Deg F)
NOTE: 5 MINUTE AVERAGE DATA
NOTE: DATA IS UNCHECKED AND UNVERIFIED - FOR INFORMATION ONLY
NOTE: SNSWP TEMPERATURE IS FROM C1A1346
NOTE: ALL DATA BASED ON POND LEVEL OF 574' (WHICH WAS RAISED IN 1996)
Date
5 Minute Average Data

C06


Catawba Nuclear Station
2002 Pond Temperature
(updated 07/27/05 by Norman Stambaugh)
TECH SPEC LIMIT (91.5)
OAC HI-HI LIMIT (90.4)
NOTE: 5 MINUTE AVERAGE DATA
NOTE: DATA IS UNCHECKED AND UNVERIFIED - FOR INFORMATION ONLY
NOTE: SNSWP TEMPERATURE IS FROM C1A1346
NOTE: ALL DATA BASED ON POND LEVEL OF 574' (WHICH WAS RAISED IN 1996)
SNSWP Temperature (Deg F)
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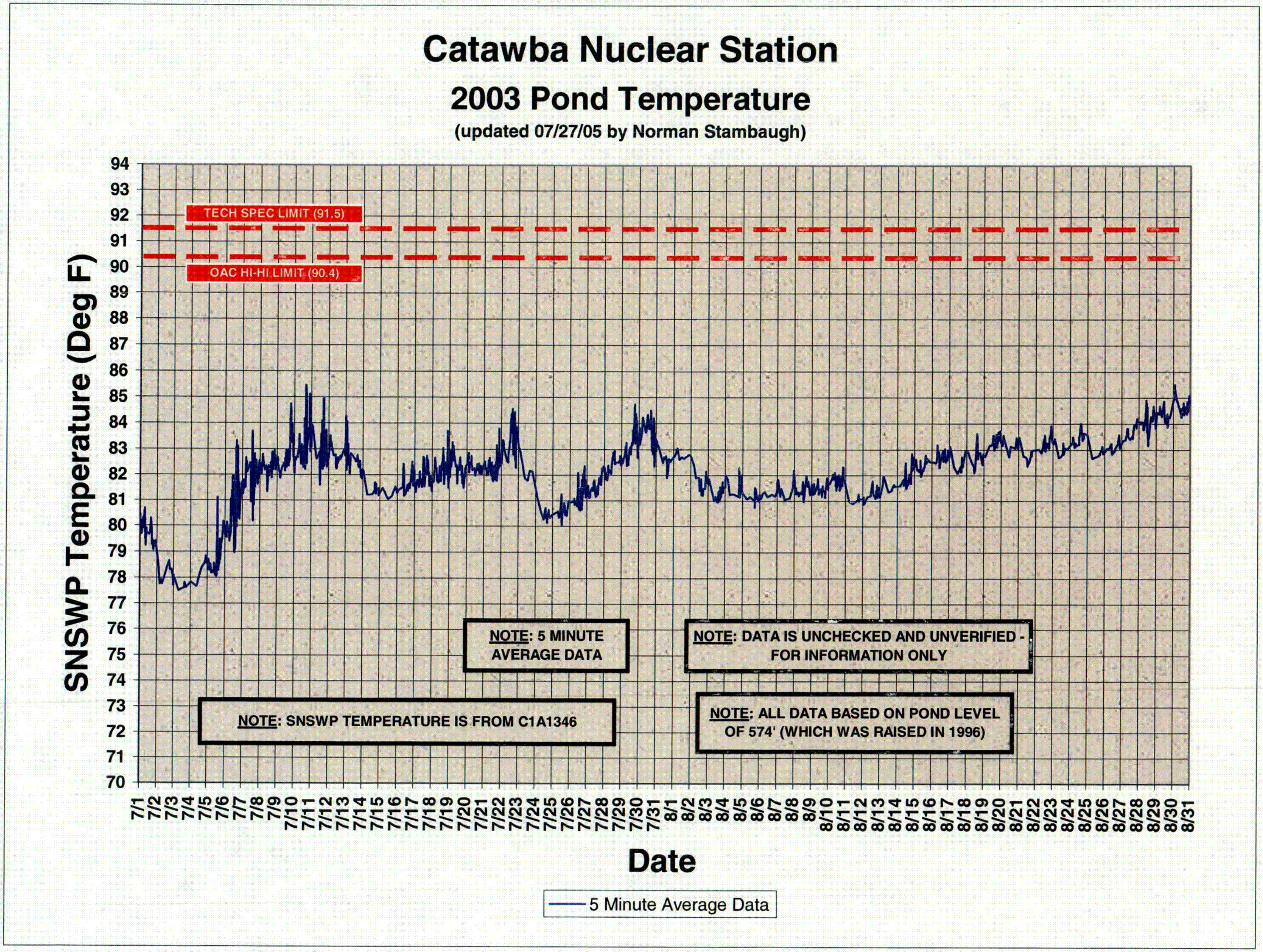
8/31
Date
5 Minute Average Data

C07

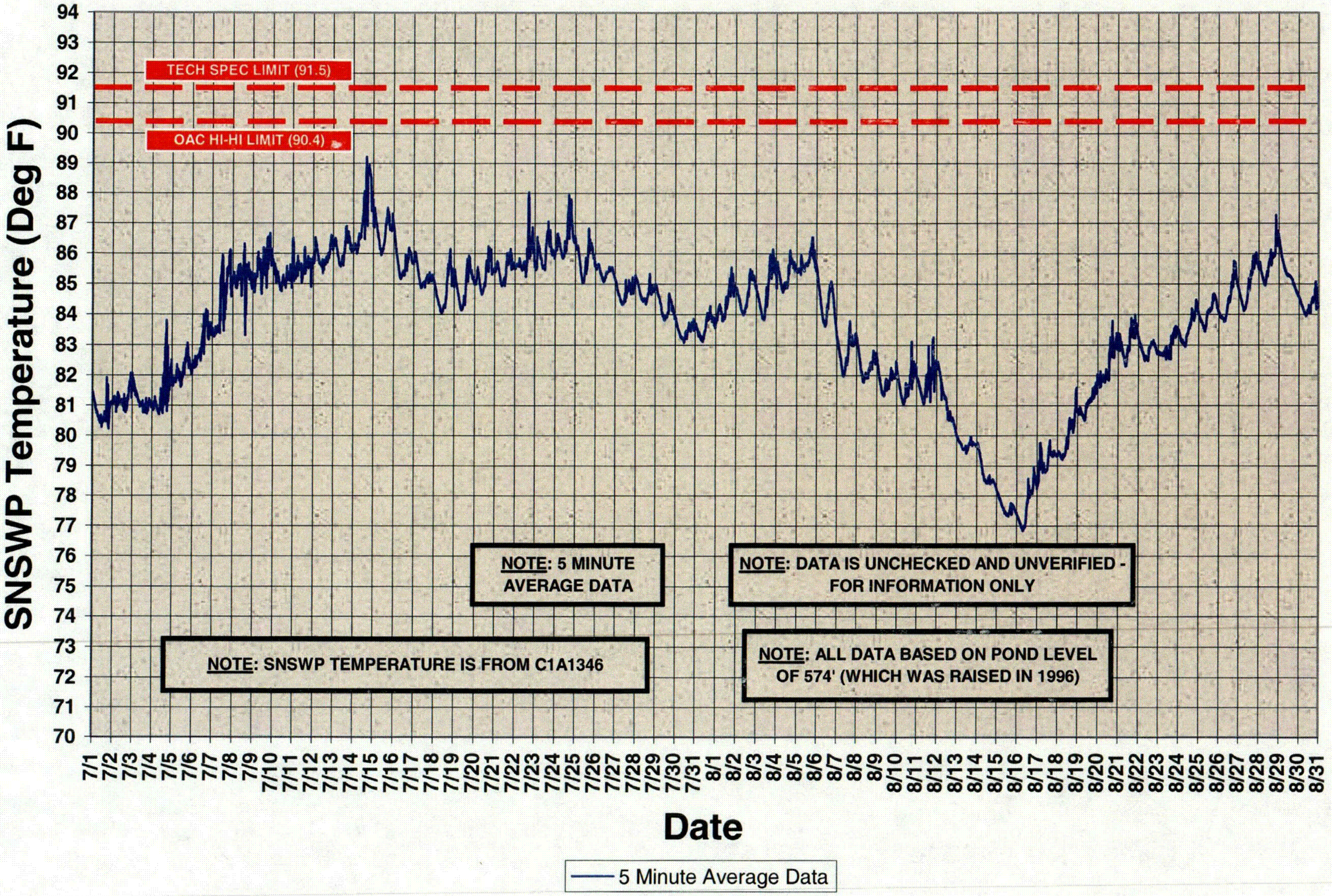

Catawba Nuclear Station
2003 Pond Temperature
(updated 07/27/05 by Norman Stambaugh)
TECH SPEC LIMIT (91.5)
OAC HI-HI LIMIT (90.4)
SNSWP Temperature (Deg F)
NOTE: 5 MINUTE AVERAGE DATA
NOTE: DATA IS UNCHECKED AND UNVERIFIED - FOR INFORMATION ONLY
NOTE: SNSWP TEMPERATURE IS FROM C1A1346
NOTE: ALL DATA BASED ON POND LEVEL OF 574' (WHICH WAS RAISED IN 1996)
Date
5 Minute Average Data

C08

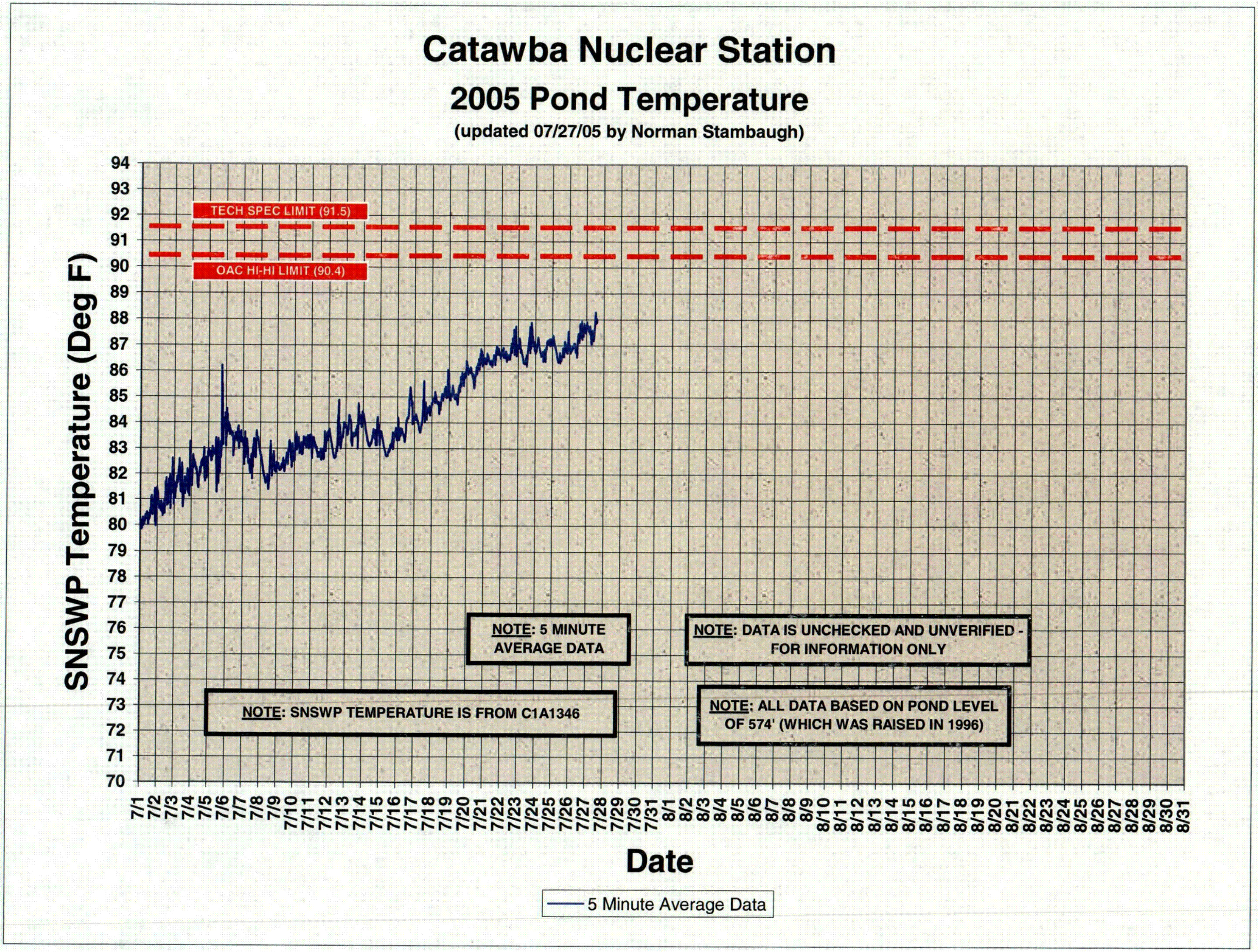
Catawba Nuclear Station

2004 Pond Temperature

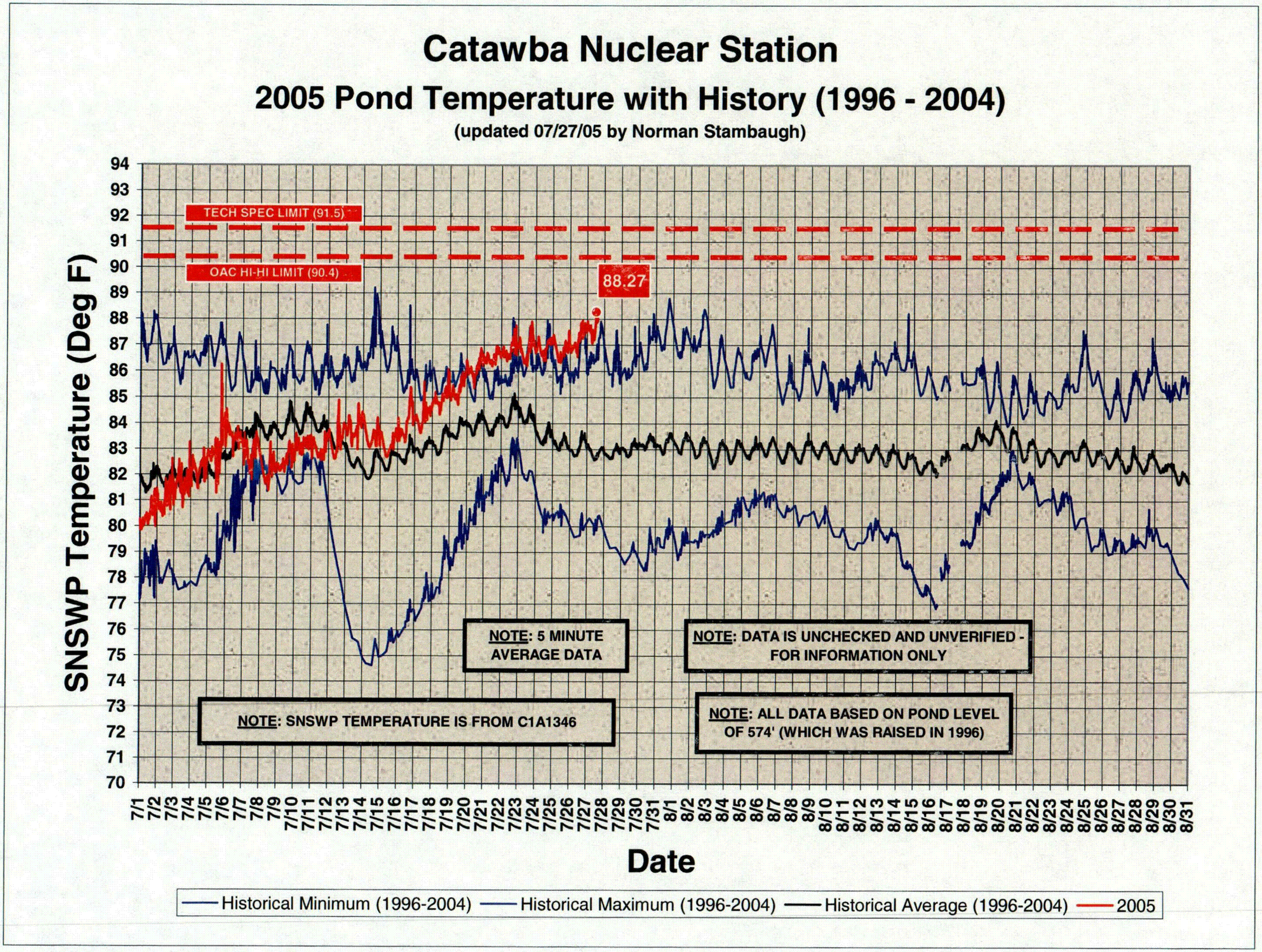
(updated 07/27/05 by Norman Stambaugh)



C09


Catawba Nuclear Station
2005 Pond Temperature
(updated 07/27/05 by Norman Stambaugh)
SNSWP Temperature (Deg F)
TECH SPEC LIMIT (91.5)
OAC HI-HI LIMIT (90.4)
NOTE: 5 MINUTE AVERAGE DATA
NOTE: DATA IS UNCHECKED AND UNVERIFIED - FOR INFORMATION ONLY
NOTE: SNSWP TEMPERATURE IS FROM C1A1346
NOTE: ALL DATA BASED ON POND LEVEL OF 574' (WHICH WAS RAISED IN 1996)
Date
5 Minute Average Data

C10



Catawba Nuclear Station
2005 Pond Temperature with History (1996 - 2004)
(updated 07/27/05 by Norman Stambaugh)
SNSWP Temperature (Deg F)
TECH SPEC LIMIT (91.5)
OAC HI-HI LIMIT (90.4)
88.27
NOTE: 5 MINUTE AVERAGE DATA
NOTE: DATA IS UNCHECKED AND UNVERIFIED - FOR INFORMATION ONLY
NOTE: SNSWP TEMPERATURE IS FROM C1A1346
NOTE: ALL DATA BASED ON POND LEVEL OF 574' (WHICH WAS RAISED IN 1996)
Date
Historical Minimum (1996-2004)
Historical Maximum (1996-2004)
Historical Average (1996-2004)
2005

C11

ENCLOSURE 2

REVISED MARKED-UP AND REPRINTED TS BASES PAGES

B 3.7 PLANT SYSTEMS

B 3.7.9 Standby Nuclear Service Water Pond (SNSWP)

BASES

BACKGROUND

The SNSWP provides a heat sink for processing and operating heat from safety related components during a transient or accident, as well as during normal operation. This is done by utilizing the Nuclear Service Water System (NSWS) and the Component Cooling Water (CCW) System.

The SNSWP has been defined as the water source, including necessary retaining structure, but not including the cooling water system intake structures as discussed in the UFSAR, Section 9.2 (Ref. 1). The principal functions of the SNSWP are the dissipation of sensible heat during normal operation, and dissipation of residual and sensible heat after an accident or normal operation.

The basic performance requirements are that a 30 day supply of water be available, and that the design basis temperatures of safety related equipment not be exceeded.

Additional information on the design and operation of the SNSWP can be found in Reference 1.

APPLICABLE SAFETY ANALYSES

Replace with revised APPLICABLE SAFETY ANALYSES

~~The SNSWP is the sink for heat removed from the reactor core following all accidents and anticipated operational occurrences in which the unit is cooled down and placed on residual heat removal (RHR) operation.~~

~~The peak containment pressure analysis assumes the NSWS flow to the Containment Spray and Component Cooling Water heat exchangers has a temperature of 92°F. To ensure that this condition is not exceeded, and to ensure that long term NSWS temperature does not exceed the 100°F design basis of NSWS components a limit of 91.5°F is conservatively observed for the SNSWP. This temperature is important in that it, in part, determines the capacity for energy removal from containment. The peak containment pressure occurs when energy addition to containment (core decay heat) is balanced by energy removal from these heat exchangers. This balance is reached far out in time,~~

BASES

APPLICABLE SAFETY ANALYSES (continued)

Replace with revised APPLICABLE SAFETY ANALYSES

~~after the transition from injection to cold leg recirculation and after ice melt. Because of the effectiveness of the ice bed in condensing the steam which passes through it, containment pressure is insensitive to small variations in containment spray temperature prior to ice meltout.~~

~~Long term equipment qualification of safety related components required to mitigate the accident is based on a continuous, maximum NSWS supply temperature of 100°F.~~

~~To ensure that the NSWS initial temperature assumptions in the peak containment pressure analysis are met, Lake Wylie temperature is also monitored. During periods of time while Lake Wylie temperature is greater than 92°F, the emergency procedure for transfer of Emergency Core Cooling System (ECCS) flow paths to cold leg recirculation directs the operator to align at least one train of containment spray to be cooled by a loop of NSWS which is aligned to the SNSWP. Swapover to the SNSWP is required at 92°F rather than 91.5°F because Lake Wylie is not subject to subsequent heatup due to recirculation, as is the SNSWP. Therefore, the 100°F design basis maximum temperature is not approached.~~

~~The operating limits are based on conservative heat transfer analyses for the worst case LOCA. Reference 1 provides the details of the assumptions used in the analysis. The SNSWP is designed in accordance with Regulatory Guide 1.27 (Ref. 2), which requires a 30 day supply of cooling water in the SNSWP.~~

~~The SNSWP satisfies Criterion 3 of 10 CFR 50.36 (Ref. 3).~~

LCO

The SNSWP is required to be OPERABLE and is considered OPERABLE if it contains a sufficient volume of water at or below the maximum temperature that would allow the NSWS to operate for at least 30 days following the design basis ~~LOCA~~ accident without the loss of net positive suction head (NPSH), and without exceeding the maximum design temperature of the equipment served by the NSWS. To meet this condition, the SNSWP temperature should not exceed ~~91.5~~ 95°F at 568 ft mean sea level and the level should not fall below 571 ft mean sea level during normal unit operation.

Revised APPLICABLE SAFETY ANALYSES for TS 3.7.9 Bases:

The SNSWP is the seismically-assured sink for heat removed from the reactor core following all accidents and anticipated operational occurrences in which the unit is cooled down and placed on residual heat removal (RHR) operation.

NSWS temperature influences containment pressure following a Loss of Coolant Accident and offsite dose following a Main Steam Line Break. The containment peak pressure analysis can accommodate NSWS temperatures up to 100°F. The Main Steam Line Break dose analysis assumes an activity release from the steam generators for the time required to cool the Reactor Coolant System (RCS) to 210°F. The NSWS temperature assumed in the current analysis is 95.5°F. This assumption prevents the RCS cooldown time from exceeding that assumed in the current Main Steam Line Break dose analysis. Therefore, the Main Steam Line Break is limiting with respect to the assumed NSWS temperature.

To ensure that the assumptions related to NSWS temperature in the safety analyses remain valid and to ensure that long term NSWS temperature does not exceed the 100°F design basis of the NSWS components, a limit of 95°F is observed for the initial temperature of the SNSWP. This temperature is important in that it, in part, determines the capacity for energy removal from containment incorporated into the peak containment pressure analysis. NSWS temperature is also important in determining the time required to cool the RCS of a nuclear unit after the occurrence of an accident. This in turn determines the extent of releases of radioactivity to the environment following a Main Steam Line Break.

The peak containment pressure occurs when energy addition to containment (core decay heat) is balanced by energy removal from the Containment Spray and Component Cooling Water heat exchangers. This balance is reached after the transition from injection to cold leg recirculation and after ice melt. Because of the effectiveness of the ice bed in condensing the steam which passes through it, containment pressure is insensitive to small variations in containment spray temperature prior to ice meltout.

Long term equipment qualification of safety related components required to mitigate the accident is based on a continuous, maximum NSWS supply temperature of 100°F or less.

To ensure that the NSWS initial temperature assumptions in the limiting analysis are met, Lake Wylie temperature is also monitored. During periods of time while Lake Wylie temperature is greater than 95.5°F, the emergency procedure for transfer of Emergency Core Cooling System (ECCS) flow paths to cold leg recirculation directs the operator to align both trains of containment spray to be cooled by loops of NSWS which are aligned to the SNSWP. Swapover to the SNSWP is required at 95.5°F rather than 95°F because Lake Wylie is not subject to subsequent heatup due to recirculation, as is the SNSWP. Therefore, the 100°F design basis maximum temperature is not approached.

The operating limits are based on conservative heat transfer analyses for the worst case accident. Reference 1 provides the details of the assumptions used in the analysis. The SNSWP is designed in accordance with Regulatory Guide 1.27 (Ref. 2), which requires a 30 day supply of cooling water in the SNSWP.

The SNSWP satisfies Criterion 3 of 10 CFR 50.36 (Ref. 3).

BASES

APPLICABILITY

In MODES 1, 2, 3, and 4, the SNSWP is required to support the OPERABILITY of the equipment serviced by the SNSWP and required to be OPERABLE in these MODES.

In MODE 5 or 6, the requirements of the SNSWP are determined by the systems it supports.

ACTIONS

A.1

If the SNSWP is inoperable the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 6 hours and in MODE 5 within 36 hours.

The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.9.1

This SR verifies that adequate long term (30 day) cooling can be maintained. The specified level also ensures that sufficient NPSH is available to operate the NSWS pumps. The 24 hour Frequency is based on operating experience related to trending of the parameter variations during the applicable MODES. This SR verifies that the SNSWP water level is ≥ 571 ft mean sea level.

SR 3.7.9.2

This SR verifies that the NSWS is available to cool the CCW System to at least its maximum design temperature with the maximum accident or normal design heat loads for 30 days following a Design Basis Accident. The 24 hour Frequency is based on operating experience related to trending of the parameter variations during the applicable MODES. This SR verifies that the average water temperature of the SNSWP is
95 ≤ ~~91.5~~°F. The SR is modified by a note that states the Surveillance is only required to be performed during the months of July, August, and September. During other months, the ambient temperature is below the surveillance limit.

NO CHANGES THIS PAGE.
FOR INFORMATION ONLY

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.9.3

This SR verifies dam integrity by inspection to detect degradation, erosion, or excessive seepage. Operating experience has shown that these components usually pass the Surveillance when performed at the 12 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

REFERENCES

1. UFSAR, Section 9.2.
2. Regulatory Guide 1.27.
3. 10 CFR 50.36, Technical Specifications, (c)(2)(ii).

B 3.7 PLANT SYSTEMS

B 3.7.9 Standby Nuclear Service Water Pond (SNSWP)

BASES

BACKGROUND

The SNSWP provides a heat sink for processing and operating heat from safety related components during a transient or accident, as well as during normal operation. This is done by utilizing the Nuclear Service Water System (NSWS) and the Component Cooling Water (CCW) System.

The SNSWP has been defined as the water source, including necessary retaining structure, but not including the cooling water system intake structures as discussed in the UFSAR, Section 9.2 (Ref. 1). The principal functions of the SNSWP are the dissipation of sensible heat during normal operation, and dissipation of residual and sensible heat after an accident or normal operation.

The basic performance requirements are that a 30 day supply of water be available, and that the design basis temperatures of safety related equipment not be exceeded.

Additional information on the design and operation of the SNSWP can be found in Reference 1.

APPLICABLE SAFETY ANALYSES

The SNSWP is the seismically-assured sink for heat removed from the reactor core following all accidents and anticipated operational occurrences in which the unit is cooled down and placed on residual heat removal (RHR) operation.

NSWS temperature influences containment pressure following a Loss of Coolant Accident and offsite dose following a Main Steam Line Break. The containment peak pressure analysis can accommodate NSWS temperatures up to 100°F. The Main Steam Line Break dose analysis assumes an activity release from the steam generators for the time required to cool the Reactor Coolant System (RCS) to 210°F. The NSWS temperature assumed in the current analysis is 95.5°F. This assumption prevents the RCS cooldown time from exceeding that assumed in the current Main Steam Line Break dose analysis. Therefore, the Main Steam Line Break is limiting with respect to the assumed NSWS temperature.

APPLICABLE SAFETY ANALYSES (continued)

To ensure that the assumptions related to NSWS temperature in the safety analyses remain valid and to ensure that long term NSWS temperature does not exceed the 100°F design basis of the NSWS components, a limit of 95°F is observed for the initial temperature of the SNSWP. This temperature is important in that it, in part, determines the capacity for energy removal from containment incorporated into the peak containment pressure analysis. NSWS temperature is also important in determining the time required to cool the RCS of a nuclear unit after the occurrence of an accident. This in turn determines the extent of releases of radioactivity to the environment following a Main Steam Line Break.

The peak containment pressure occurs when energy addition to containment (core decay heat) is balanced by energy removal from the Containment Spray and Component Cooling Water heat exchangers. This balance is reached after the transition from injection to cold leg recirculation and after ice melt. Because of the effectiveness of the ice bed in condensing the steam which passes through it, containment pressure is insensitive to small variations in containment spray temperature prior to ice meltout.

Long term equipment qualification of safety related components required to mitigate the accident is based on a continuous, maximum NSWS supply temperature of 100°F or less.

To ensure that the NSWS initial temperature assumptions in the limiting analysis are met, Lake Wylie temperature is also monitored. During periods of time while Lake Wylie temperature is greater than 95.5°F, the emergency procedure for transfer of Emergency Core Cooling System (ECCS) flow paths to cold leg recirculation directs the operator to align both trains of containment spray to be cooled by loops of NSWS which are aligned to the SNSWP. Swapover to the SNSWP is required at 95.5°F rather than 95°F because Lake Wylie is not subject to subsequent heatup due to recirculation, as is the SNSWP. Therefore, the 100°F design basis maximum temperature is not approached.

The operating limits are based on conservative heat transfer analyses for the worst case accident. Reference 1 provides the details of the assumptions used in the analysis. The SNSWP is designed in accordance with Regulatory Guide 1.27 (Ref. 2), which requires a 30 day supply of cooling water in the SNSWP.

The SNSWP satisfies Criterion 3 of 10 CFR 50.36 (Ref. 3).

BASES

LCO

The SNSWP is required to be OPERABLE and is considered OPERABLE if it contains a sufficient volume of water at or below the maximum temperature that would allow the NSWS to operate for at least 30 days following the design basis accident without the loss of net positive suction head (NPSH), and without exceeding the maximum design temperature of the equipment served by the NSWS. To meet this condition, the SNSWP temperature should not exceed 95°F at 568 ft mean sea level and the level should not fall below 571 ft mean sea level during normal unit operation.

APPLICABILITY

In MODES 1, 2, 3, and 4, the SNSWP is required to support the OPERABILITY of the equipment serviced by the SNSWP and required to be OPERABLE in these MODES.

In MODE 5 or 6, the requirements of the SNSWP are determined by the systems it supports.

ACTIONS

A.1

If the SNSWP is inoperable the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 6 hours and in MODE 5 within 36 hours.

The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.9.1

This SR verifies that adequate long term (30 day) cooling can be maintained. The specified level also ensures that sufficient NPSH is available to operate the NSWS pumps. The 24 hour Frequency is based on operating experience related to trending of the parameter variations during the applicable MODES. This SR verifies that the SNSWP water level is ≥ 571 ft mean sea level.

SR 3.7.9.2

This SR verifies that the NSWS is available to cool the CCW System to at least its maximum design temperature with the maximum accident or normal design heat loads for 30 days following a Design Basis Accident.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The 24 hour Frequency is based on operating experience related to trending of the parameter variations during the applicable MODES. This SR verifies that the average water temperature of the SNSWP is ≤ 95°F. The SR is modified by a note that states the Surveillance is only required to be performed during the months of July, August, and September. During other months, the ambient temperature is below the surveillance limit.

SR 3.7.9.3

This SR verifies dam integrity by inspection to detect degradation, erosion, or excessive seepage. Operating experience has shown that these components usually pass the Surveillance when performed at the 12 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

REFERENCES

1. UFSAR, Section 9.2.
2. Regulatory Guide 1.27.
3. 10 CFR 50.36, Technical Specifications, (c)(2)(ii).