U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

OFFICE OF NUCLEAR REACTOR REGULATION

6.2.1.5 MINIMUM CONTAINMENT PRESSURE ANALYSIS FOR EMERGENCY CORE COOLING SYSTEM PERFORMANCE CAPABILITY STUDIES

REVIEW RESPONSIBILITIES

Primary - Containment Systems and Severe Accident Branch (SCSB)[1]

Secondary - None

I. AREAS OF REVIEW

Following a loss-of-coolant accident in a pressurized water reactor (PWR) plant, the emergency core cooling system (ECCS) will supply water to the reactor vessel to reflood, and thereby cool the reactor core. The core flooding rate is governed by the capability of the ECCS water to displace the steam generated in the reactor vessel during the core reflooding period. For PWR plants, there is a direct dependence of core flooding rate on containment pressure; i.e., the core flooding rate will increase with increasing containment pressure. Therefore, as part of the overall evaluation of ECCS performance, the SCSB reviews analyses of the minimum containment pressure that could exist during the period of time until the core is reflooded following a loss-of-coolant accident to confirm the validity of the containment pressure used in ECCS performance capability studies. The SCSB[2] reviews the assumptions made regarding the operation of engineered safety feature heat removal systems; the effectiveness of structural heat sinks within the containment to remove energy from the containment atmosphere, and other heat removal processes, such as steam in the containment mixing with ECCS water spilling from the break in the reactor coolant system; and in the case of ice condenser containments, mixing with water from melted ice that drains into the lower containment volume. The review is done for all PWR containment types, i.e., dry, subatmospheric, and ice condenser containments.

It should be noted that the minimum containment pressure analysis done in connection with ECCS performance evaluation differs from the containment functional performance analysis, in that the conservatisms and margins are taken in opposite directions in the two cases. Thus, the minimum containment pressure analysis required by the regulations for ECCS performance evaluation is not conservative with regard to peak containment pressure in the event of a loss-of-coolant accident and cannot be used to determine the containment design basis.

Review Interfaces:[3]

The SCSB[4] will coordinate the review with the Reactor Systems Branch (SRXB~~RSB~~[5]), which is responsible for determining the acceptability of the mass and energy release data used in the minimum containment pressure analysis~~(see~~ as part of its primary review responsibility for SRP Section 6.3~~)~~.[6] This information is derived from the applicant's evaluation of ECCS performance capability in accordance with 10 CFR Part 50, §50.46~~ and Appendix K to 10 CFR Part 50~~[7].

For the area of review identified above as being reviewed as part of the primary review responsibility of another branch, the acceptance criteria and their methods of application are contained in the referenced SRP section.[8]

II. ACCEPTANCE CRITERIA

~~CSB acceptance criteria is based on meeting the relevant requirements of 10 CFR Part 50, §50.46 paragraph I.D.2 of Appendix K to 10 CFR Part 50 which requires that the containment pressure used to evaluate the performance capability of a PWR emergency core cooling system shall not exceed a pressure calculated conservatively for that purpose.~~ [9]
SCSB Acceptance Criteria is based on meeting the relevant requirements of 10 CFR 50, §50.46. 10 CFR 50, §50.46, allows the use of either an acceptable ECCS evaluation model that realistically describes the behavior of the reactor during loss-of-coolant accidents or an ECCS evaluation model developed in conformance with 10 CFR 50, Appendix K. SCSB accepts the analysis if either of the following requirements are met as they relate to the postulated minimum containment pressure following a loss-of-coolant accident:

1. 10 CFR 50.46(a)(1)(i) if an acceptable ECCS evaluation model that realistically describes the behavior of the reactor during loss-of-coolant accidents is used, or;

2. 10 CFR 50.46(a)(1)(ii) if an ECCS evaluation model developed in conformance with 10 CFR 50, Appendix K is used. 10 CFR 50, Appendix K, paragraph I.D.2 requires that the containment pressure used to evaluate the performance capability of a PWR emergency core cooling system shall not exceed a pressure calculated conservatively for that purpose.

Specific criteria that pertain to minimum containment pressure analysis for ECCS performance studies are indicated below:

a. In meeting the requirements of 10 CFR 50.46(a)(1)(i), the model used to determine minimum containment pressure for ECCS studies should comply with Regulatory Guide

1.157. Specifically, Regulatory Guide 1.157, Position C.3.12.1 describes acceptable containment pressure models for ECCS performance analysis.[10]

b. In meeting the requirements of 10 CFR Part 50.46(a)(1)(ii), the following specific criteria~~The guidelines given below~~ [11]indicate the conservatism that analyses of the containment response to loss-of-coolant accidents should have for determining the minimum containment pressure for ECCS performance capability studies:

(1)~~.~~[12] Calculations of the mass and energy released during postulated loss-of-coolant accidents should be based on the requirements of Appendix K to 10 CFR Part 50~~(Ref. 2)~~.[13]

(2)~~.~~ Branch Technical Position CSB 6-1, "Minimum Containment Pressure Model for PWR ECCS Performance Evaluation," delineates the calculational approach that should be followed to assure a conservative prediction of the minimum containment pressure.

Technical Rationale:[14]

The technical rationale for application of the above acceptance criteria to the minimum containment pressure analysis for Emergency Core Cooling System performance capability studies is discussed in the following paragraphs.

1. 10 CFR 50.46(a)(1)(i) requires that plants be provided with an emergency core cooling system (ECCS) whose cooling performance is evaluated to meet the most severe loss-of-coolant accident (LOCA). 10 CFR 50.46(a)(1)(i) allows the ECCS evaluation to use a realistic model that describes the behavior of the reactor coolant system during a LOCA. Containment minimum pressure directly affects ECCS performance. Calculation and analysis of this parameter, therefore, is an integral part of the ECCS performance evaluation. Regulatory Guide 1.157 provides specific methods that have been found acceptable by the staff in meeting 10 CFR 50.46(a)(1)(i). Complying with this regulation will assure that, in the event of a LOCA, the ECCS will perform as predicted, thereby ensuring limits on maximum peak cladding temperature, maximum cladding oxidation, and maximum hydrogen generation are met and a coolable geometry is maintained.

2. 10 CFR 50.46(a)(1)(ii) requires that plants be provided with an emergency core cooling system (ECCS) whose cooling performance is evaluated to meet the most severe loss-of-coolant accident (LOCA). 10 CFR 50.46(a)(1)(ii) requires the ECCS performance evaluation to utilize a model based on 10 CFR 50 Appendix K. This Appendix, which provides specific calculational methods for evaluating ECCS performance, contains significant conservatisms to address the uncertainties regarding post-LOCA plant behavior that existed at the time it was developed. Containment minimum pressure directly affects ECCS performance. Calculation and analysis of this parameter, therefore, is an integral part of the ECCS performance evaluation. Complying with this regulation will assure that, in the event of a LOCA, the ECCS will perform as predicted, thereby ensuring limits on maximum peak cladding temperature, maximum cladding oxidation, and maximum hydrogen generation are met and a coolable geometry is maintained.

III. REVIEW PROCEDURES

The review procedures described below are followed for the review of the minimum containment pressure analysis. The reviewer selects and emphasizes material from these procedures as may be appropriate for a particular case. Portions of the review may be carried out on a generic basis or by applying the results of previous reviews of similar plants.

The SCSB reviews the analyses in the safety analysis report of the minimum containment pressure following a loss-of-coolant accident. The SRXB~~RSB~~ confirms the validity of the applicant's mass and energy release data. The SCSB evaluates the conservativeness of the assumptions used by the applicant regarding the operation of containment heat removal systems and the effectiveness of structural heat sinks, by comparing the applicant's calculational approach to either[15] the method outlined in Branch Technical Position CSB 6-1 or to position C.3.12.1 of Regulatory Guide 1.157 (consistent with subsection II)[16]. In certain cases, the SCSB may perform confirmatory containment pressure response analyses using the CONTEMPT-LT computer code (References 30 and 31)[17]. In these cases, containment pressure calculated by the SCSB is compared to that used in the applicant's evaluation of the performance capability of the emergency core cooling system, to assure that an appropriately conservative value has been used. The SCSB[18] advises the SRXB~~RSB~~[19] of the acceptability of the containment backpressure used in the ECCS performance evaluation.

For standard design certification reviews under 10 CFR Part 52, the procedures above should be followed, as modified by the procedures in SRP Section 14.3 (proposed), to verify that the design set forth in the standard safety analysis report, including inspections, tests, analysis, and acceptance criteria (ITAAC), site interface requirements and combined license action items, meet the acceptance criteria given in subsection II. SRP Section 14.3 (proposed) contains procedures for the review of certified design material (CDM) for the standard design, including the site parameters, interface criteria, and ITAAC.[20]

IV. EVALUATION FINDINGS

The conclusions reached on completion of the review of this SRP section are presented in SRP Section 6.2.1.

V. IMPLEMENTATION

The following is intended to provide guidance to applicants and licensees regarding the NRC staff's plans for using this SRP section.

This SRP section will be used by the staff when performing safety evaluations of license applications submitted by applicants pursuant to 10 CFR 50 or 10 CFR 52.[21] Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

The provisions of this SRP section apply to reviews of applications docketed six months or more after the date of issuance of this SRP section.[22]

VI. REFERENCES

The references[23] for this SRP section are listed in SRP Section 6.2.1.

BRANCH TECHNICAL POSITION CSB 6-1
(Currently the responsibility of Containment Systems and Severe Accident Branch - SCSB)[24]

MINIMUM CONTAINMENT PRESSURE MODEL
FOR PWR ECCS PERFORMANCE EVALUATION

A. BACKGROUND

Paragraph I.D.2. of Appendix K to 10 CFR Part 50~~(Ref. 1)~~[25] requires that the containment pressure used to evaluate the performance capability of a pressurized water reactor (PWR) emergency core cooling system (ECCS) does not exceed a pressure calculated conservatively for that purpose. It further requires that the calculation include the effects of operation of all installed pressure-reducing systems and processes. Therefore, the following branch technical position has been developed to provide guidance in the performance of a minimum containment pressure analysis. The approach described below applies only to the ECCS-related containment pressure evaluation pursuant to 10 CFR 50.46(a)(1)(ii)[26] and not to the containment functional capability evaluation for postulated design basis accidents.

B. BRANCH TECHNICAL POSITION

1. Input Information for Model

a. Initial Containment Internal Conditions

The minimum containment gas temperature, minimum containment pressure, and maximum humidity that may be encountered under limiting normal operating conditions should be used. Ice condenser plants should use the maximum containment gas temperature.

b. Initial Outside Containment Ambient Conditions

A reasonably low ambient temperature external to the containment should be used.

c. Containment Volume

The maximum net free containment volume should be used. This maximum free volume should be determined from the gross containment volume minus the volumes of internal structures such as walls and floors, structural steel, major equipment, and piping. The individual volume calculations should reflect the uncertainty in the component volumes.

d. Purge Supply and Exhaust Systems

If purge system operation is proposed during the reactor operating modes of startup, power operation, hot standby and hot shutdown, the system lines should be assumed to be initially open.

2. Active Heat Sinks

a. Spray and Fan Cooling Systems

The operation of all engineered safety feature containment heat removal systems operating at maximum heat removal capacity; i.e., with all containment spray trains operating at maximum flow conditions and all emergency fan cooler units operating, should be assumed. In addition, the minimum temperature of the stored water for the spray cooling system and the cooling water supplied to the fan coolers, based on technical specification limits, should be assumed.

Deviations from the foregoing will be accepted if it can be shown that the worst conditions regarding a single active failure, stored water temperature, and cooling water temperature have been selected from the standpoint of the overall ECCS model.

b. Containment Steam Mixing With Spilled ECCS Water

The spillage of subcooled ECCS water into the containment provides an additional heat sink as the subcooled ECCS water mixes with the steam in the containment. The effect of the steam-water mixing should be considered in the containment pressure calculations.

c. Containment Steam Mixing With Water from Ice Melt

The water resulting from ice melting in an ice condenser containment provides an additional heat sink as the subcooled water mixes with the steam while draining from the ice condenser into the lower containment volume. The effect of the steam-water mixing should be considered in the containment pressure calculations.

3. Passive Heat Sinks

a. Identification

The passive heat sinks that should be included in the containment evaluation model should be established by identifying those structures and components within the containment that could influence the pressure response. The kinds of structures and components that should be included are listed in Table 1.

Data on passive heat sinks have been compiled from previous reviews and have been used as a basis for the simplified model outlined below. This model is acceptable for minimum containment pressure analyses for construction permit applications, and until such time (i.e., at the operating license review) that a complete identification of available heat sinks can be made. ~~This simplified approach has also been followed for operating plants by licensees complying with Section 50.46(a)(2) of 10 CFR Part 50. For such cases, and for construction permit reviews, w~~Where a detailed listing of heat sinks within the containment ~~often~~ cannot be provided, the following procedure may be used to model the passive heat sinks within the containment:[27]

(1) Use the surface area and thickness of the primary containment steel shell or steel liner and associated anchors and concrete, as appropriate.

(2) Estimate the exposed surface area of other steel heat sinks in accordance with Figure 1~~2~~[28] and assume an average thickness of 9.53 mm (3/8 inch)[29].

(3) Model the internal concrete structures as a slab with a thickness of 30 5 cm (one foot)[30] and exposed surface of 15,000 m^2 (160,000 ft^2~~,~~)[31].

The heat sink thermophysical properties that would be acceptable are shown in Table 2.

Applicants should provide a detailed list of passive heat sinks, with appropriate dimensions and properties.

b. <u>Heat Transfer Coefficients</u>

The following conservative condensing heat transfer coefficients for heat transfer to the exposed passive heat sinks during the blowdown and post-blowdown phases of the loss-of-coolant accident should be used (see Figure 2):

(1) During the blowdown phase, assume a linear increase in the condensing transfer coefficient from $h_{initial}$ = 8 Btu/hr-ft^2-°F, at t = 0, to a peak value four times greater than the maximum calculated condensing heat transfer coefficient at the end of blowdown, using the Tagami correlation[32] (Reference~~.~~ 2)[33],

$$h_{max}=7.25(Q/Vt_p)^{0.62}$$

where h_{max} = maximum heat transfer coefficient, Btu/hr-ft^2-°F
Q = primary coolant energy, Btu
V = net free containment volume, ft^3
t_p = time interval to end of blowdown, sec.

(2) During the long-term post-blowdown phase of the accident, characterized by low turbulence in the containment atmosphere, assume condensing heat transfer coefficients 1.2 times greater than those predicted by the Uchida data (Reference. 3)[34] and given in Table 3.

(3) During the transition phase of the accident, between the end of blowdown and the long-term post-blowdown phase, a reasonably conservative exponential transition in the condensing heat transfer coefficient should be assumed (See Figure 2).

The calculated condensing heat transfer coefficients based on the above method should be applied to all exposed passive heat sinks, both metal and concrete, and for both painted and unpainted surfaces.

Heat transfer between adjoining materials in passive heat sinks should be based on the assumption of no resistance to heat flow at the material interfaces. An example of this is the containment liner to concrete interface.

(4) Variations from the above guidelines may be found acceptable if the overall ECCS performance evaluation model results in an acceptable peak calculated fuel cladding temperature.

C. REFERENCES

1. 10 CFR Part 50, 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Reactors," and 10 CFR Part 50, Appendix K, "ECCS Evaluation Models."

2. T. Tagami, "Interim Report on Safety Assessment and Facilities Establishment Project in Japan for Period Ending June 1965 (No. 1)," prepared for the National Reactor Testing Station, February 28, 1966 (unpublished work).

3. H. Uchida, A. Oyama, and Y. Toga, "Evaluation of Post-Incident Cooling Systems of Light-Water Power Reactors," Proc. Third International Conference on the Peaceful Uses of Atomic Energy, Volume 13, Session 3.9, United Nations, Geneva (1964).

~~4. Schmitt, R. C., Bingham, G. E., and Manberg, J. A., "Simulated Design Basis Accident Tests of the Carolinas Virginia Tube Reactor Containment - Final Report," IN-1403, Idaho Nuclear Corporation, December 1970.~~ [35]

TABLE 1

IDENTIFICATION OF CONTAINMENT HEAT SINKS

1. Containment Building (e.g., liner plate and external concrete walls, floor, sump, and linear anchors).

2. Containment Internal Structures (e.g., internal separation walls and floors, refueling pool and fuel transfer pit walls, and shielding walls).

3. Supports (e.g., reactor vessel, steam generator, pumps, tanks, major components, pipe supports, and storage racks).

4. Uninsulated Systems and Components (e.g., cold water systems, heating, ventilation and air conditioning systems, pumps, motors, fan coolers, recombiners, and tanks).

5. Miscellaneous Equipment (e.g., ladders, gratings, electrical cables, trays, and cranes).

TABLE 2[36]

HEAT SINK THERMOPHYSICAL PROPERTIES

Material	Density kg/m^3 (lb/ft^3) [37]	Specific Heat kJ/kg-°K(Btu/lb-°F)[38]	Thermal Conductivity W/m-°K(Btu/hr-ft-°F)[39]
Concrete	2330 (145)	0.654 (0.156)	1.6 (0.92)
Steel	7850 (490)	0.503 (0.12)	47 (27.0)

TABLE 3[40]

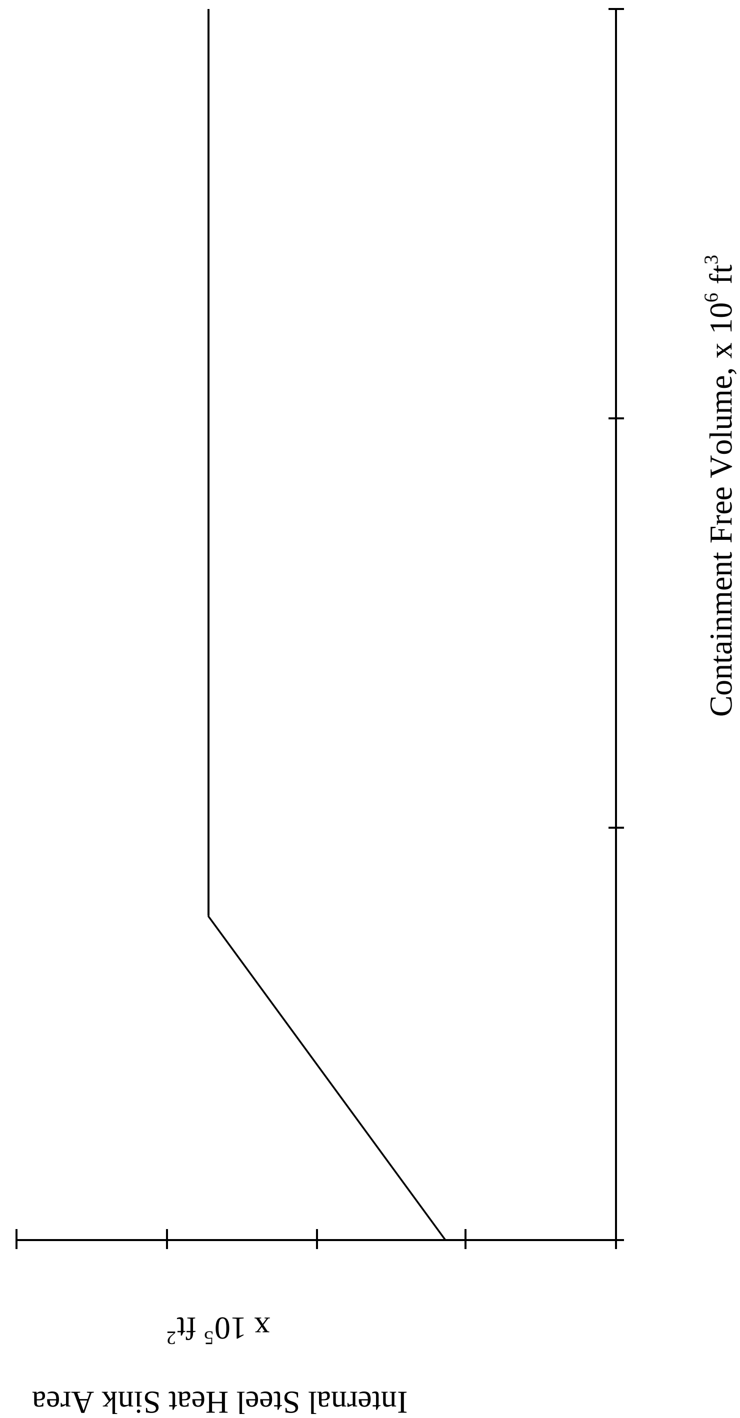
UCHIDA HEAT TRANSFER COEFFICIENTS

Mass Ratio (kg(lb) air/kg(lb)[41] steam)	Heat Transfer Coefficient (W/m^2-°K (Btu/hr-ft^2-○F,[42])	Mass Ratio (kg(lb) air/kg(lb)[43] steam)	Heat Transfer Coefficient (W/m^2-°K (Btu/hr-ft^2-○F,[44])
50	12 (2)	3	165 (29)
20	46 (8)	2.3	211 (37)
18	52 (9)	1.8	262 (46)
14	57 (10)	1.3	358 (63)
10	80 (14)	0.8	557 (98)
7	97 (17)	0.5	795 (140)
5	120 (21)	0.1	1590 (280)
4	137 (24)		

[45]

This figure uses English units, and will therefore be replaced by the figure on page 14.[42]

Figure 1
Area of Steel Heat Sinks Inside Containment



This figure supercedes the figure on page 13.

Figure 1
Area of Steel Heat Sinks Inside Containment

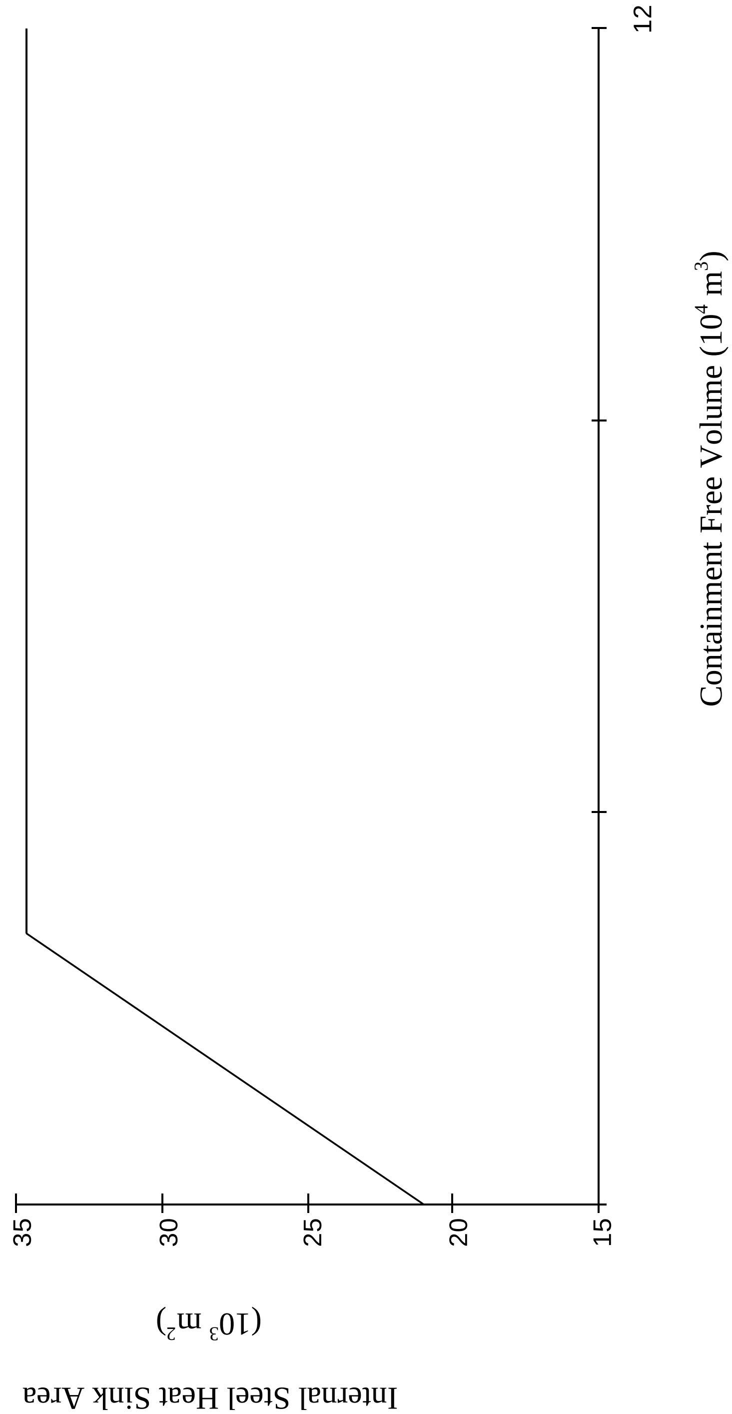
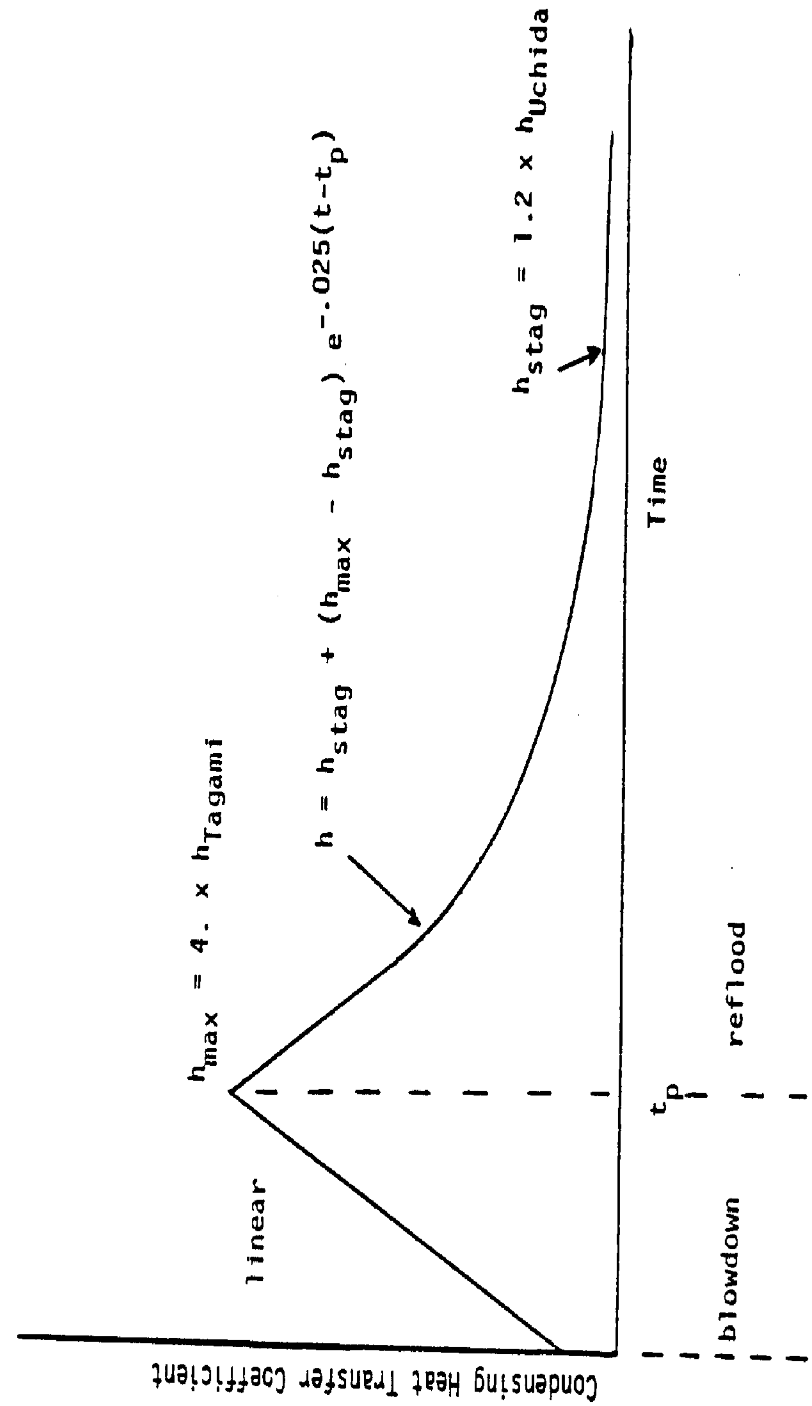


Figure 2
Condensing Heat Transfer Coefficients for Static Heat Sinks



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SRP Draft Section 6.2.1.5

Attachment A - Proposed Changes in Order of Occurrence

Item numbers in the following table correspond to superscript numbers in the redline/strikeout copy of the draft SRP section.

Item	Source	Description
1.	Current PRB names and abbreviations.	Editorial change made to reflect current PRB name and responsibility for this SRP Section.
2.	Current PRB names and abbreviations.	Editorial change made to reflect current PRB name and responsibility for this SRP Section (2 identical changes in this paragraph).
3.	SRP-UPD format item, Reformat Areas of Review	Added "Review Interfaces" heading to Areas of Review. Reformatted existing description of a single review interface to describe how SCSB reviews aspects of the Minimum Containment Pressure Analysis under another SRP section and how another branch supports the review.
4.	Current PRB names and abbreviations.	Editorial change made to reflect current PRB name and responsibility for this SRP Section.
5.	Current PRB names and abbreviations.	Editorial change made to reflect current PRB name and responsibility for SRP Section 6.3.
6.	SRP-UDP format item, Review Interfaces	Converted the parenthetical reference to SRP section 6.3 by adding the phrase "as part of its primary review responsibility for" for consistency with other sections and to meet SRP-UDP format guidance for Review Interfaces.
7.	**Integrated impact 319.**	Deleted specific reference to 10 CFR 50 Appendix K since applicant now has another option for his ECCS model within 10 CFR 50.46.
8.	SRP-UPD format item, Reformat Areas of Review	Added standard closing sentence for Review Interfaces to be consistent with required SRP-UDP format.
9.	Editorial	A sentence describing 10 CFR 50 appendix K was deleted for consistency with the standard format of Acceptance Criteria in other sections and to allow insertion of the proper wording to incorporate II 319 changes into the Acceptance Criteria.
10.	**Integrated Impact 319**	The Acceptance Criteria section was modified to add 10 CFR 50.46(a)(1)(i) as an alternative acceptance criterion that applicants may use in evaluating ECCS performance with respect to minimum containment pressure. A specific criterion invoking Regulatory Guide 1.157 was also added. Standard format and wording were used for consistency with other SRP sections.
11.	Editorial	The sentence was modified to create a standard lead in sentence for the specific criterion for 10 CFR 50.46(a)(1)(ii) for consistency with other SRP sections.

Item	Source	Description
12.	Editorial	Two subparagraphs of specific criterion b were numbered for clarity and consistency with other sections.
13.	SRP-UDP format item	Format change to make the citation of references consistent with SRP-UDP guidance.
14.	SRP-UPD format item, Develop Technical Rationale.	Added Technical Rationale for 10 CFR §50.46(a)(1)(i) and 10 CFR §50.46(a)(1)(ii). Technical Rationale is a new SRP-UDP format item.
15.	Editorial	Added the word "either" for clarity and to highlight that the applicant may choose between two alternatives.
16.	**Integrated Impact 319**	Added a citation of Reg Guide 1.157 to Review Procedures. This RG is an alternative method of ECCS analysis. Also referred back to subsection II for clarification on how to apply this reference.
17.	SRP-UDP format item, Unverified References	Format change to make the citation of references consistent with SRP-UDP guidance. These references cannot be verified to be the most current references that are still approved by the NRC.
18.	Current PRB names and abbreviations.	Editorial change made to reflect current PRB name and responsibility for this SRP Section (5 identical changes in this paragraph).
19.	Current PRB names and abbreviations.	Editorial change made to reflect current PRB name and responsibility for SRP Section 6.3 (2 identical changes in this paragraph).
20.	SRP-UDP Guidance, Implementation of 10 CFR 52	Added standard paragraph to address application of Review Procedures in design certification reviews.
21.	SRP-UDP Guidance, Implementation of 10 CFR 52	Added standard sentence to address application of the SRP section to reviews of applications filed under 10 CFR Part 52, as well as Part 50.
22.	SRP-UDP Guidance	Added standard paragraph to indicate applicability of this section to reviews of future applications.
23.	Editorial	"Reference" was changed to "references" to indicate that there are multiple references.
24.	Current PRB names and abbreviations.	Editorial note to reflect the current name and abbreviation for the PRB responsible for this BTP.
25.	SRP-UDP format item	Format change to make the citation of references consistent with SRP-UDP guidance.
26.	**Integrated Impact 319**	Added a reference to 10 CFR 50.46(a)(1)(ii), the Appendix K approach, to make it clear that this appendix does not apply if 10 CFR 50.46(a)(1)(i), the realistic model approach, is used.

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Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
27.	Editorial	Modified the sentence to delete reference to 10 CFR Part 50.46(a)(2). This article previously provided the implementation schedule of 10 CFR 50.46 for near term and operating plants. This article was removed in 1988, and a new 10 CFR 50.46(a)(2) was added concerning an entirely new subject (NRR restrictions of plants not complying with 10 CFR 50.46). The new 10 CFR 50.46(a)(2) is not applicable in the current context.
28.	Editorial	Figure "2" was changed to Figure "1". It appears that the 2 was a typographical error. Figure 2 pertains to heat transfer coefficients, not surface areas. Figure 1 pertains to surface areas. Prior to this change there was no reference to figure 1 within the BTP.
29.	SRP-UDP format item, Metrication policy implementation	The existing criteria of 3/8 inch for the assumed average thickness of modeled steel heat sinks in containment was converted to 9.53 mm using the guidance of Federal Standard 376B.
30.	SRP-UDP format item, Metrication policy implementation	The existing criteria of one foot for the thickness of modeled concrete slabs in containment was converted to 30.5 cm using the guidance of Federal Standard 376B.
31.	SRP-UDP format item, Metrication policy implementation	The existing criteria of 160,000 ft^2 for the exposed surface of modeled concrete slabs in containment was converted to 15,000 m^2 using the guidance of Federal Standard 376B.
32.	SRP-UDP format item, Metrication policy implementation	This formula was not converted to metric units. The Tagami correlation is complex and was originally calculated in english units. It has therefore been left in its original form.
33.	SRP-UDP format item	Format change to make the citation of references consistent with SRP-UDP guidance.
34.	SRP-UDP format item	Format change to make the citation of references consistent with SRP-UDP guidance.
35.	SRP-UDP format item	Format change to make the citation of references consistent with SRP-UDP guidance. This reference is not cited or used in the BTP.
36.	Editorial	Table 2 was placed in a boxed table format for clarity.
37.	SRP-UDP format item, Metrication policy implementation	The existing criteria of 145 and 490 lb/ft^3 for the density of concrete and steel were converted to 2330 and 7850 kg/m^3 using the guidance of Federal Standard 376B.

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Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
38.	SRP-UDP format item, Metrication policy implementation	The existing criteria of 0.156 and 0.12 Btu/lb-°F for the specific heat of concrete and steel were converted to 0.654 and 0.51 W/m^2-°K using the guidance of Federal Standard 376B.
39.	SRP-UDP format item, Metrication policy implementation	The existing criteria of 0.92 and 27.0 Btu/hr-°F for the thermal conductivity of concrete and steel were converted to 1.6 and 47 W/m-°K using the guidance of Federal Standard 376B.
40.	Editorial	Table 3 was placed in a boxed table format for clarity.
41.	SRP-UDP format item, Metrication policy implementation	The existing units of lb air/lb steam for the Uchida Heat Transfer Coefficients were converted to kg air/kg steam using the guidance of Federal Standard 376B. Since this was a simple unit conversion that did not involve any numerical calculation, no conversion documentation was created.
42.	SRP-UDP format item, Metrication policy implementation	Existing criteria of heat transfer coefficients in Btu/hr-ft^2-°F were converted to coefficients in W/m^2-°K using the guidance of Federal Standard 376B.
43.	SRP-UDP format item, Metrication policy implementation	The existing units of lb air/lb steam for the Uchida Heat Transfer Coefficients were converted to kg air/kg steam using the guidance of Federal Standard 376B.
44.	SRP-UDP format item, Metrication policy implementation	Existing criteria of heat transfer coefficients in Btu/hr-ft^2-°F were converted to coefficients in W/m^2-°K using the guidance of Federal Standard 376B. See enclosed conversion documentation.
45.	SRP-UDP format item, Metrication policy implementation	Units of ft^2 vs ft^3 for existing Figure 1 were converted to units of m^2 vs m^3 using the guidance of Federal Standard 376B. See enclosed conversion documentation. Also, the unit labels were changed to a (10^3 m^2) and (10^4 m^3) format for clarity.

SRP Draft Section 6.2.1.5

Attachment B - Cross Reference of Integrated Impacts

Integrated Impact No.	Issue	SRP Subsections Affected
319	Consideration should be given to revising the Areas of Review, Acceptance Criteria, and Review Procedures to address the use of realistic, or best-estimate evaluation models for ECCS analysis in accordance with 10 CFR 50.46 and Regulatory Guide 1.157.	Subsection I, Areas Of Review, Review Interface Subsection II, Acceptance Criteria, general criteria 1 and 2, specific criterion a Subsection III, Review Procedures, second paragraph BTP CSB 6-1, Subsection A