PDR

70-1151

Westinghouse Electric Corporation

Water Reactor Divisions

Box 355
Pittsburgh Pennsylvania 15230

June 12, 1979

WRD-LS&S-771

U. S. Nuclear Regulatory Commission
Office of Nuclear Material Safety & Safeguards
Division of Fuel Cycle & Material Safety
Washington, D. C. 20555

Attention: Mr. L. C. Rouse, Chief
Fuel Processing & Fabrication Branch

Gentlemen:

Reference: WRD-LS&S-703, dated April 3, 1979

Subject: Transmittal of Additional Information to Support the Amendment Application to Expand Facility, License SNM-1107, Docket 70-1151

The Westinghouse Electric Corporation hereby transmits additional information to support our application for amendment to expand the Columbia facility. The material transmitted herewith responds to NRC questions transmitted to us by your letter dated May 22, 1979.

The enclosures include specific responses to each question and revised pages where appropriate. The revisions are summarized in the attached Revision Record.

The proprietary portion of this transmittal is being transmitted under separate correspondence in accordance with the provisions of 10 CFR 2.790.

If you have any questions regarding this matter, please write me at the above address or telephone me on 412-373-4652.

Very truly yours,

Ronald P. DiPiazza, Manager
NES License Administration

/slw

Attachments

13175

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ENCLOSURES TO TRANSMITTAL OF JUNE 12, 1979

LICENSE SNM-1107, DOCKET 70-1151

Question 1

Page 6 - The revision record for page 18 appears inconsistent with the balance of the application and the marking of page 18.

W Response

The information on page 6 is correct; the date and revision number for page 18 were incorrect. A revised page 18 is attached.

Question 2

Page 18 - The date and revision number appear to be incorrect.

W Response

Attached is a changed page 18 with the correct revision number and date. Figure 1.3.2.1 was also modified to show the relative locations of the auxiliary incinerator, solvent extraction process and chemical process development within the plant expansion.

Question 3

Page 194C - Revision number, date and docket number were omitted. Please provide a corrected page.

W Response

Attached is a changed page 194C with the docket number, dates and revision number included.

Question 4

Page 194i - It is implied that the recirculating scrubber system may not be sampled and analyzed on system loading. Please justify from the criticality safety viewpoint.

W Response

Attached is a modified page 194i with revised description of incinerator surveys to measure any biases between the feed and ash counting steps. The revision provides a more detailed description of exhaust system surveys of possible uranium accumulations including scrubber solution sampling.

Question 5

Page 194j - Since the wording of this page with respect to the allowable limit of U-235 in any ash container is not clear and is identical to the corresponding wording on page 190, which is clarified by Condition 28 of the license, that condition will be revised to incorporate reference to page 194j also.

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ENCLOSURES TO TRANSMITTAL OF JUNE 12, 1979

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W Response

Attached is a revised page 194j which changes the ash container mass limit to correspond to the MPV from Figure 2.3.2.1. This is justified on the basis that the ash containers will comply with two criteria, the nuclearly safe volume or diameter criteria from page 194i and the mass limit described above.

Question 6

Page 194k - In view of the deletion of references of automatic mechanisms in the description of the incinerator safety mechanisms, additional information on automatic shutdown should be provided or it should be confirmed that there will be an operator in attendance at all times during operation.

W Response

The automatic shutdown requirements of subparagraph 2.2.12 of the license also apply to the auxiliary incinerator. Attached is a modified page 194k with the appropriate reference to this section.

Question 7

Page 194s - (a) If the dissolver criticality safety is based on batch control, are batches varied according to enrichment and if so, how are enrichments kept separated? (b) What is done to ensure that residues do not accumulate between dissolution batches? (c) Are the "MPV for diameter" criteria based on solution or oxide systems and if solutions are assumed, how are accumulations of uranium-bearing solid residues prevented?

W Response

(a) Batch charging is used as the criticality safety control for the dissolver. The maximum permissible charge limit is normally based upon the largest possible enrichment for homogeneous oxides as given in Figure 2.3.2.1. Therefore, enrichment control is not necessary for criticality control purposes.

The dissolvers also meet the MPV for diameter. Consequently, enrichment separation is not required except to assure that the enrichment does not exceed 4.15 w/o U-235.

(b) Dissolution is facilitated by pump mixing of dissolver contents with solutions pulled from the conical bottom of the column, filtered and re-introduced at the top of the column. Therefore, residue accumulation in the dissolvers is not considered possible.

W Response (cont.)

(c) The dissolver diameter is 10 inches which satisfied the MPV for both solutions and homogenous oxides for <4.15 w/o U-235. As indicated above, however, residue accumulation is not considered possible.

Question 8

Page 194x - What temperature or other controls are used in the uranyl nitrate concentration and nitric acid recovery steps to avoid possible "red oil" explosions?

W Response

Vessels in the uranyl nitrate concentration and nitric acid recovery systems are steam heated. Temperature controls are provided for both the uranyl nitrate concentration and nitric acid recovery vessels which shut off the steam supply to these vessels at approximately 270°F (the explosive reaction occurs at temperatures above 275°F). In addition, TBP degradation products are routinely removed from the solvent extraction system prior to introduction into the vessels.

Question 9

Page 194z - Since a possible disposal alternative for treated spent solvent is as nonradioactive chemical waste, the test should include the procedures and criteria for determining that the treated spent solvent is free of radioactive material.

W Response

For disposal of spent solvent as chemical waste, the solvent will be mixed to obtain a uniform concentration, representatively sampled, and analyzed for gross alpha. If alpha concentrations are below the applicable limits in 10 CFR 20, Appendix B, Table II, the solutions can be released for unrestricted use.

Question 10

Pages 122, 122a, 122b - (a)The equipment pieces should be identified by name. (b) How was it concluded that the "central unit" chosen was the limiting case?

W Response

(a) Attached is revised page 122a with an additional column identifying each vessel by name.

(b) It was concluded that the V-1082 was the limiting case by considering the extraction and stripping columns as the most central units (using the maximum diameter of each column) and the most reactive units. The 1087 and 1076 tanks contain UNH products at concentrations (120 grams U per liter) approaching the maximum in the system.

Page 122b has been revised to show V-1082 as the central unit.

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Question 11

Page 194ad (a) What is the meaning of the formula in the second paragraph and where is it given in TID 7016, Rev. 1? (b) Why was V-1081 considered to have a keff bare of 0.58 when the diameter is less than that of the other units? (c) Since the keff value from Figure 2.3.2.13 applies to solution, it should be confirmed that all of the vessels will be limited to solutions of uranium at concentration not exceeding 50 g U/l.

W Response

(a) The formula is from Figure 25, page 35 of TID 7016, Revision 1 and should have read $\Omega = (\frac{2d}{h}) \sin \theta$.

It is a formula for solid angle calculation by the point to plane method applied to cylinders.

(b) The K_{eff} for V 1-81 should have been 0.25.

(c) All solutions in the solvent extraction system are less than 5 grams U - 235/liter (maximum of 238.1 grams U/liter for a minimum 2.1% enrichment).

Attached is a revised page 194ad to reflect the above changes.

Question 12

Page 194ad (cont.) - (a) Why doesn't the total angle on page 194ad agree with the quoted maximum page 122a? (b) Are the V-1087 vessels the same as T-1087 on the layout or are there redundant numbers with different prefixes?

W Response

(a) This difference resulted from failure to correct an old draft. Page 194ad, Figure 1.9.4.1 and Table 1.9.4.1 have been corrected and replaced. The total solid angle on page 194ad should read "2.9299 steradians which is 78.1% of the maximum allowable value of 3.75 steradians." The appropriate change was made to page 194ad.

(b) The vessels V-1087 and T-1087 are the same. The vessel identification was changed to T-1087 on page 122a.

Question 13

Please augment the description of the process to degrade enriched uranium to source material with a detailed description of the sampling and analytical procedure to verify that the product does not exceed 0.71 wt% uranium-235 in the uranium.

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W Response

When this license amendment application was submitted, the proposed uranium recovery process described in Attachment 3 was thought to be feasible. Since then, however, chemical tests indicate that the solubility of the sludge was not compatible with the uranium recovery system. Permission was then obtained to solidify the CaF_2 sludge and bury the fixed material at a licensed burial ground (W letters dated March 22 & 23, 1979). All existing sludge will be disposed in this manner.

W is currently developing a process to further extract uranium from liquid waste streams generated during the chemical production of UO_2. The degrading of enriched uranium to natural uranium will be conducted following the waste treatment step but before the fluoride precipitation step.

Unfortunately, this advanced waste treatment process has not progressed sufficiently to completely describe the degradation at this time. Consequently, we request that this aspect of the application be deferred until the process is finalized and that the plant expansion review be considered as a separate request.

Information concerning the naturalization will be submitted by August 31, 1979.

Question 14

Please provide a plot plan, similar to Figure 3.1-1 of the Westinghouse Environmental Report, showing the area of the proposed expansion in relation to the existing plant, the new solvent extraction area, the chemical process development facility and the new incinerator system.

W Response

Figure 1.3.2.1 has been revised to show the relative locations of these processes.

REVISION RECORD

Revision No.	Date of Revision	Pages Revised	Revision Reason
9	6-12-79	18	Add locations of process area within plant expansion.
9	6-12-79	194c	Add Docket No., Dates and Revision No. to bottom of page.
9	6-12-79	1?4i	Provide additional information on steps to be taken on system loading.
9	6-12-79	194j	Modify ash container limit to correspond to MPV from Figure 2.3.2.1.
9	6-12-79	194k	Addition of a statement referencing the automatic shutdown provisions of subparagraph 2.2.12.
9	6-12-79	122a	Add identification for each process.
9	6-12-79	194ad	Correct geometry formula, K_{eff} reference, and solid angle values.
9	6-12-79	122b	New Figure 1.9.4.1 with V1082 as the center element.

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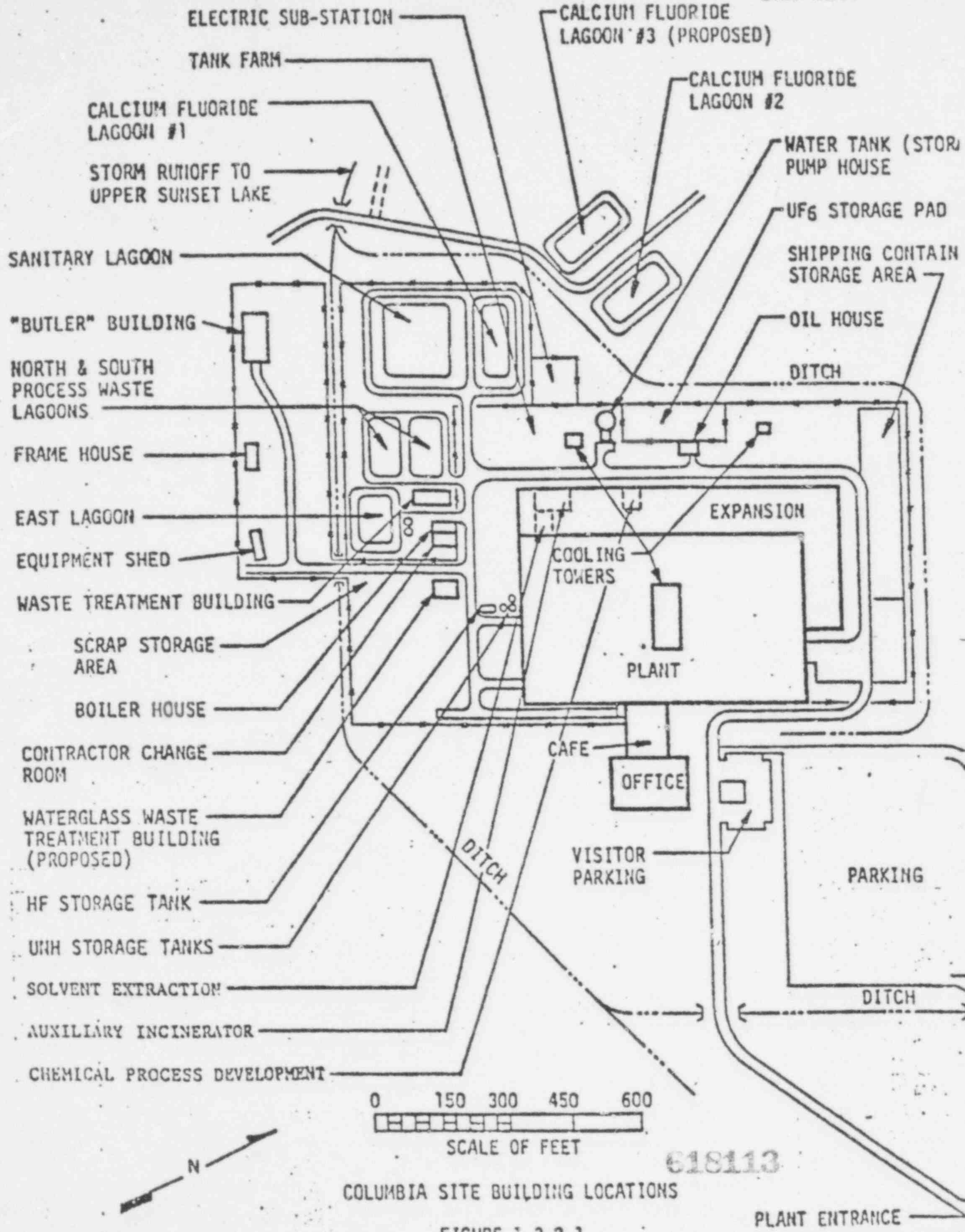

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COLUMBIA SITE BUILDING LOCATIONS

FIGURE 1.3.2.1

1.9.7.4.8 The gas flow then travels through a condenser and any liquid removed is returned to the scrubber pump.

1.9.7.4.9 The dewatered exhaust gases are reheated by the duct heater before entering the HEPA filter house. All duct work between the condenser and the exhaust blower will be heated and insulated. The top, bottom and sides of the HEPA filter house will also be heated and insulated.

1.9.7.4.10 The exhaust blower will be mounted in the second floor equipment room with a stack up through the roof. An isokinetic probe will be installed a minimum of 5 duct diameters above the blower. A small back-up blower will be installed in parallel with the primary blowe-. The back-up blower will only operate when the primary blower fails. The back-up blower is only to permit an orderly shut-down.

1.9.7.5 Radiological Safety Control

The incinerator system is installed within the Contamination Controlled Area of the plant. Only authorized personnel are allowed into this area. Operating personnel are required to submit to the bioassay program for routine urinalyses. Lung burden determinations (subparagraph 3.2.3) and the use of external radiation exposure monitoring devices (subparagraph

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1.9.7.6 Nuclear Safety Control (cont.)

reach, incinerator operations are suspended, ash removed and gamma counted, and a survey of the system made to measure any biases which may exist between the feed and ash counting steps. This survey will include all equipment in the incinerator exhaust system which has the potential for uranium accumulation, including the scrubber solution, HEPA filters, quench tower and packed column. The surveys will include sampling and analyses, gamma counting, gamma survey with a portable instrument or visual surveys as appropriate. Alternatively, the 9

MUF may be adjusted to zero after each burn. In this case, the ash would be removed and the entire incinerator system would be thoroughly cleaned, visually inspected, and surveyed for residual contamination prior to release by the Radiation Protection Component.

After operation of the incinerator, ash is removed with a vacuum cleaner or other means and loaded into containers such as polypaks, fiberpaks or metal pails. Both the vacuum cleaner and the ash containers are either limited to a nuclearly safe volume or a nuclearly safe diameter. The applicable maximum permissible values specified in Figures 2.3.2.2 and 2.3.2.3 respectively for 4.15 w/o homogeneous oxides will be used. The ash is gamma counted and a comparison of ash count with charge count is made and a MUF determined. Whenever the total MUF (initial plus adjustments) approaches the safe mass limit,

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1.9.7.6 Nuclear Safety Control (cont.)

the system is thoroughly cleaned and, if necessary, new components are installed and the system is resurveyed to establish a new system (initial holdup) MUF. Each container of ash is limited to a maximum of 21.5 pounds of total uranium which is a maximum permissible value for 4.15% enriched material as specified in Figure 2.3.2.1. Containers of ash are stored in a designated section of the Contamination Controlled Area near the incinerator in accordance with the applicable nuclear criticality control criteria established in subparagraph 2.3.2.2. Ash may be processed for recovery of the SNM or disposed of to a licensed burial facility. 9

The wet scrubber system sump tank (water reservoir), filters and heat exchanger are each in the form of cylinders with an effective inside diameter of 10.2" or less. The heat exchanger is considered a flow through device and the sump tank and filters are spaced in accordance with surface density criteria. 10.2" is the maximum permissible c inder diameter for 4.15 w/o material specified in Figure 2.3.2.3 for homogeneous material.

1.9.7.7 Safety Mechanisms

Safety controls exist in several areas of the system to insure safe operation of the system as well as control operational upsets and/or malfunctions that could occur. These are listed as follows:

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1.9.7.7 Safety Mechanisms (cont.)

1.9.7.7.1 High temperature (approximate 250°F) detected in the Quench Tower Sump. Alarm Indication. Appropriate actions are taken to correct the situation.

1.9.7.7.2 Low indications in the scrubber system weir liquid flow. Alarm Indication. Appropriate actions are taken to correct the situation.

1.9.7.7.3 Low indication on system air flow. Alarm Indication. Appropriate actions are taken to correct the situation.

1.9.7.7.4 ΔP HEPA filter high. Alarm Indication. Appropriate actions are taken to correct the situation.

As enumerated above, sufficient means are provided for immediate detection and correction of problems that could occur in the incinerator system. For this reason, adverse in-plant and off-site effects due to system failures are not considered likely.

However, the provisions of subparagraph 2.2.12 apply to the auxiliary incinerator, including the automatic shutdown requirements described therein. 9

1.9.7.8 Improvements in the operation, logic and functional control of this system may be made as indicated by new regulations and/or operating experience.

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1.9.9.6 Nuclear Safety Control (cont.)

distances between the center element and other process vessels and equipment. Although the geometric centers of all the process vessels and equipment are not in the same plane, all separation distances were conservately assumed to be at right angles with respect to the lines joining their geometric centers with that of the center element.

All subcrits were reduced to cylindrical geometries on an equivalent cross-sectional area basis using the formula $\Omega=\frac{2d}{h}(\sin\theta)$, from TID-7016, Revision 1. No distinction was made between horizontally and vertically oriented subcrits. That is, the orientation of all subcrits was assumed to be vertical. 9

Solid angle calculations were made assuming six (6) different vessels V-1081, V-1082, T-1076D, T-1087C, T-1087D, and T-1087E to be the central subcrit. The K_{eff} for each of the central subcrit vessels was determined from the curve shown in Figure 2.3.2.13 of the license. The solid angle for V-1082 was calculated to be 2.9299 steradians or 78.1% of the maximum allowable value of 3.75 steradians. This is the highest percentage of the maximum allowable solid angle. 9

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