

December 18, 2000

Mr. L. Edward Nanney, Director
Division of Radiological Health
Department of Environment & Conservation
L&C Annex, Third Floor
401 Church Street
Nashville, TN 37243-1532

Dear Mr. Nanney:

Thank you for your faxed response to our January 7, 2000 letter and for your staff arranging the visit to the Manufacturing Sciences Corporation (MSC) facility and the subsequent meetings in your office. As you are aware, we have been examining the MSC licensing action in connection with questions raised in an October 25, 1999 letter to the Nuclear Regulatory Commission (NRC) from Congressmen Dingell, Klink, and Markey. As a part of this effort, we requested, and you supplied, license file documentation in support of issuance of the license amendment to MSC authorizing the processing and release for unrestricted use of nickel containing very low levels of residual radioactivity. The purpose of the visit to the MSC facility and of the discussions with your staff was to gather additional information and answer remaining questions. NRC's review was complicated by the nature of the licensing action and the method that the State of Tennessee used to document their approval of the license modification. The NRC took the opportunity to review the State of Tennessee's documentation base and to discuss the technical support basis with MSC in order to clarify certain questions and issues remaining from NRC's initial review of the licensing action. We have enclosed the team's report which addresses the areas identified by the team as needing clarification or further information that were identified in the team's November 1999 report. We are also providing a copy of the team's report to Congressmen Dingell, Klink, and Markey.

The NRC staff did not identify any health and safety issues which would warrant action by Tennessee to amend or modify the license. The information collected during this process was considered by the Integrated Materials Performance Evaluation Program (IMPEP) team, which reviewed your program August 21-25, 2000, and issued its final report on November 27, 2000. With respect to the indicator, Technical Quality of Licensing Actions, the IMPEP team concluded that Tennessee's overall performance was satisfactory. The NRC staff determination on the MSC licensing action is consistent with the IMPEP team conclusion.

In addition, at a May 2000 Commission meeting on release of solid materials, one presenter raised concerns relating to findings from the Department of Energy (DOE) audits at the MSC facility. The NRC staff requested these audits and reviewed them to determine if there were any findings that had bearing on the licensing action at the MSC facility. Our review of the DOE audit did not identify any potential MSC non-compliance with respect to the Tennessee license or areas that were not addressed by the MSC Corrective Action Response to the audit.

L. Edward Nanney

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December 18, 2000

We appreciate your assistance in this matter. If you have any questions on our review of the enclosed findings, please call me at 301-415-3340 or Dennis Sollenberger at 301-415-2819 or DMS4@NRC.GOV.

Sincerely,

/RA By Frederick C. Combs Acting for/

Paul H. Lohaus, Director
Office of State and Tribal Programs

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STP-AG-26

**QUESTIONS RESULTING FROM THE
REVIEW OF THE TENNESSEE (TN) LICENSE APPROVAL OF RELEASE OF NICKEL
FROM THE MANUFACTURING SCIENCES CORPORATION (MSC) FACILITY
IN OAK RIDGE, TN¹**

Final Team Observations

To address the questions resulting from the review of the information provided by the State of TN, the Nuclear Regulatory Commission (NRC) staff visited the MSC facility on April 10, 2000 to get first hand information, reviewed the MSC licensing files and supporting information in Nashville, and held discussion with TN staff and management on the license amendment for MSC on April 11-12, 2000. The State staff also prepared a general response to the January 7, 2000 letter which is attached to this document. The NRC observations are based on the information provided by the State and the licensee. All questions were addressed in sufficient detail for the NRC staff to determine that adequate information was available for the State of Tennessee to make a determination that the public health and safety would be protected and that their criteria for issuing such an amendment were met by the licensee.

I.A. Question: Regarding the dose assessment, the review team did not identify the specific acceptance criteria (dose level) used by TN as their decision criteria to either grant or deny the license amendment proposal. (Please provide the documentation of the acceptance criteria (dose level) used by TN.)

Team Observation: The State staff stated that they use the surficial radioactivity concentration criteria in Regulatory Guide (RG) 1.86, a 1 mrem/yr dose criterion, international standards, as appropriate, and ALARA as the criteria for approving release of materials. The State used these criteria for the MSC license amendment. This was confirmed by the MSC presentation on April 10, 2000, during which they stated that State staff had informed them that if the dose was greater than 1 mrem/yr the amendment would not be approved. The State staff used 1 mrem/yr in their verification dose analysis (see I.C.2.e below). State staff also stated that they require all materials to pass the RG 1.86 surface criteria prior to release from any facility.

Question: From information contained in the letter dated November 19, 1999, and other documents provided by TN, the review team was uncertain how the comparison was used by TN in this licensing action. (Please provide an explanation of any comparison made by TN based on RG 1.86 guidance and how the guidance was applied by TN in the licensing action.)

Team Observation: As discussed below in I.B., the 3 Bq/g limit for Tc-99 and the 0.3 Bq/g limit for uranium were developed by MSC to stay within the 1 mrem/yr dose

¹The questions resulted from the Team's review of Tennessee's amendment of the MSC license and identified in Enclosure 1 of Paul H. Lohaus' January 7, 2000 letter to L. Edward Nanney. The questions need to be considered in the context of the November 16, 1999 submittal from Tennessee and the NRC staff review of that material.

criterion. The RG 1.86 surficial contamination criteria are applied independently from the volumetric contamination limits (3.0 and 0.3 Bq/g limits) which are based on the 1 mrem/yr dose criterion. Use of RG 1.86 is appropriate for verifying surface contamination levels on materials leaving the MSC site. However, the proposed application of the RG 1.86 as a basis for a volumetric release standard is not appropriate and is inconsistent with NRC practice. The State relied on the dose assessments contained in the MSC Risk Analysis for decision making purposes, rather than the volumetric calculations based on RG 1.86.

- I.B. Question: The MSC proposal did not describe how the proposed concentration levels were selected by MSC. Also, the review team was not able to determine whether the proposed release limits were based on the nickel decontamination process performance, as portions of the process are proprietary and thus were unavailable to the review team. (Please provide the basis for the concentration limits proposed by MSC.)

Team Observation: During the meeting at the MSC facility, MSC staff stated that the 3 Bq/g limit for Tc-99 and 0.3 Bq/g limit for uranium were developed based on their ability to meet the 1 mrem/yr criterion established by State staff. The MSC Risk Analysis (November 1998) included a dose assessment of impacts from the release of recycled nickel at these limits. MSC relied on computer codes such as VARSKIN, MicroShield, and RESRAD to address numerous scenarios which could reasonably be expected in the reuse of recycled nickel. The evaluation of consumer products manufactured from steel made from contaminated nickel estimated doses well below the 1 mrem/yr criterion. The evaluation of doses from other pathways (slag disposal and transportation of contaminated nickel) estimated higher doses, but also well below the 1 mrem/yr dose criterion. On the basis of the information provided at the MSC facility and in the State files, the State's conclusion that MSC can produce refined nickel to comply with these concentration limits appears reasonable. (See team observations in I.C.2.b, I.C.2.c).

Question: The assessment did not include exposure scenarios, such as scrap and slag workers, that may result in doses higher than those expected from users of consumer products. (Please explain why these scenarios were not included in the assessment.)

Team Observation: During the meeting on April 10, 2000, MSC staff stated that they looked at the steel worker and slag handler and considered their time and proximity to the radioactivity. In general, independent analyses indicate a higher dose conversion factor for slag workers and metal fabricators, but their decreased exposure times can limit the estimated dose in comparison to other potential exposures. MSC concluded that the truck driver scenario had higher proximity and exposure times and, therefore, was bounding for such worker exposure scenarios for this specific licensing action. MSC also stated that workers would not be cutting the sheets of nickel with torches, but that the sheets would be cut with shear cutters that do not generate fumes or dust. The shear cutters also cut the material very quickly reducing the time that a worker is near the material. They considered the truck driver scenario to cover the doses to other workers handling the nickel as it went through the steel-making process.

Independent analyses conducted by NRC, assuming other scenarios and parameter values than those used by MSC, estimated annual doses on the order of a few millirem per year. However, the NRC analyses did not incorporate process-specific information which was used by MSC in its analysis.

- I.C.1.a Question: The team review raised questions regarding the calculations, such as the basis for assuming a half-inch thick sheet of nickel, dilution of the nickel into stainless steel by a factor of 0.12, and contamination on only one side of the sheet. The review also identified a mathematical error (5000 dpm/100 cm², not 5000 dpm/cm²) in the calculation, which, if corrected, would result in a volumetric concentration that is less than the proposed volumetric release limit. As stated above, it was unclear to the review team how the comparison was used by TN in this licensing action. (Please explain the basis for selecting the thicknesses of the nickel product and other adjustment factors that were used in the surface to volume criteria conversion calculation.)

Team Observation: Regarding the 0.12 nickel content, the team observations in I.C.2.c further discusses the variability of nickel in final products. The State staff agreed that there was a mathematical error in the calculation as presented. The State staff indicated that the determining factor in the approval of release of the nickel was the dose assessment results compared to the 1 mrem/yr dose criterion and that the surface to volumetric activity comparisons were used to put the volumetric contamination in perspective as discussed in I.A. above. The State staff did not use the surface-to-volume contamination value as a decision criterion.

- I.C.1.b Question: There was no documentation supplied by TN on the maximum thickness of nickel sheet that would be produced by MSC. The review team's understanding, which is based on earlier discussions with MSC staff, is that the sheets could be up to three quarters of an inch thick. (Please address this area in the explanation requested in I.C.1.a. above.)

Team Observation: Based on the discussions at MSC, the nominal sheet thickness is planned to be 3/8 inch based on process controls and weight considerations.

Question: The review team could not identify whether TN resolved the differences between TN's calculations and MSC's calculations. (Please explain how TN resolved the differences between the MSC and TN calculations.)

Team Observation: The calculations supplied by MSC were in response to questions raised by State staff during the meeting of January 20, 1999. The calculations were performed to demonstrate the amount of contamination in nickel that would cause the resultant stainless steel to be contaminated at the same level as if the stainless steel were released with surface contamination at the RG 1.86 level. (See response to I.C.1.a)

- I.C.2.a Question: However, in the information provided by TN, there was no documentation of any specific analysis of comments or questions on the assessment by TN staff. (Please describe or provide documentation, such as deficiency letters or staff analysis, for the TN review of the MSC amendment request.)

Team Observation: The State staff and MSC staff held meetings both prior to the submittal of the amendment request and after the submittal (also see Question IV below). During these meetings the State presented the criteria that must be met for them to approve such a request. At the meetings following the submittal of the amendment request, the State staff requested additional information on solubility of Tc-99, comparison of volumetric with surface contamination of stainless steel products, and research on wear of a hip joint, all of which were submitted to the State for review. The State staff stated that they may document meetings or telephone calls with licensees, and this type of action (additional information request) whether made at meetings or by telephone, is not documented consistently. The information request was not documented in this specific licensing action. The MSC license file review showed such documentation for other licensing actions. The submittals from MSC reflected the information requested by the State staff. The State managers stated that their acceptance of the information submitted by MSC was documented by the issuance of the amendment and that no additional documentation is necessary.

- I.C.2.b Question: If additional scenarios were considered by MSC and supplied to TN or were independently analyzed by TN, these documents should be part of the information supporting the amendment. (Please indicate whether additional scenarios were analyzed and, if so, provide these documents.)

Team Observation: The MSC Risk Analysis (November 1998) assessed numerous scenarios and exposure mechanisms as well as screened several potential scenarios that were not assessed in detail. TN also conducted confirmatory analyses using these scenarios (see I.C.2.e below). Other than these assessments, no other scenarios were analyzed by the State or MSC prior to the NRC evaluation. MSC staff indicated that they did evaluate the steel worker and slag worker, but considered the truck driver scenario bounding for these other workers (see I.B. 2nd question). MSC staff also stated that a worker would not use a torch to cut nickel sheets since this is typically done with shear presses. This process is quick and allows easy addition of the proper amount of material to the furnace. They also described the typical form of metals that are added to the steel making process (barrels of 3 or 4 inch squares, not large sheets of material). The State did not identify any additional scenarios that they thought should be analyzed.

- I.C.2.c Question: Consideration of higher nickel content devices would vary the resultant doses by up to a factor of 4 which would not affect the significance of these pathways. (Please provide an explanation for the selection of the consumer products and why these other products were not considered.)

Team Observation: The MSC and State staff agreed that there may be a few devices that may have higher nickel content than those analyzed; however, they concluded that it would not change the determination that release of nickel at 3 Bq/g for Tc-99 and 0.3 Bq/g for uranium would still comply with the 1 mrem/yr dose criterion. The State and MSC stated that the controlling pathway was not consumer products, but the impacts from other potential pathway scenarios such as the slag disposal and truck driver. The variation in the consumer product nickel content does not increase the dose to the consumer to a level where it would become the controlling dose.

- I.C.2.d Question: The MSC comparison of their dose assessment results to the 25 mrem/yr limit in 10 CFR 20.1402 (pages 24 and 25 of the MSC assessment) is inappropriate because that regulation concerns the release of lands and structures - not materials and equipment - from regulatory control. (Please explain why TN did not address the inappropriate use of the 25 mrem/yr limit.)

Team Observation: The MSC staff stated that they should not have made the comparison in their submittal since they were actually demonstrating compliance with the State's 1 mrem/yr criterion. The State staff determined that MSC had demonstrated compliance with the 1 mrem/yr criterion and there was no reason to make MSC modify their document since the MSC proposal was in compliance with the 25 mrem/yr limit as well.

- I.C.2.e Question: The basis for using 0.01 instead of 0.03 and 0.06 needs to be stated. The documents provided by TN did not address this aspect of the dose assessment. The review team could not determine whether TN approved the use of the ICRP-60 tissue-weighting factors. (Please provide the documentation of TN approval for the use of the ICRP-60 tissue weighting factors.)

Team Observation: The MSC staff stated that they wanted to use the best modeling to represent the dose to members of the public. The State indicated that they had accepted the dosimetry when they approved the license amendment request (see discussion below). The NRC staff indicated to the State that NRC would require a licensee to use a single dosimetric system for all dose considerations at its facility (occupational, general public, etc.). Also, NRC would require specific approval for the use of dosimetric modeling that is different than that used as the basis for the regulations.

The State responded that they used computer models which are based on ICRP-26/30 dosimetry to verify MSC's work. Therefore, the State's approval was based on their verification using the computer models and that the MSC release of nickel would be in compliance with their 1 mrem/yr dose criterion. In the computer models used by MSC, the appropriate tissue weighting factors to be applied are those based on ICRP 26/30. However, MSC did not apply those tissue weighting factors, but instead applied the weighting factors from ICRP 60. The ICRP 26/30 method weighting factors are up to 6 times higher than the ICRP 60 factors used by MSC which would increase the calculated doses accordingly. The increased doses, however, would still be much less than the 1 mrem/yr criterion.

- I.C.2.f Question: The review team could not identify from the information available whether MSC considered differing enrichment levels in their assessment. (Please provide the documentation for the enrichment used in the MSC dose assessment.)

Team Observation: In discussions with DOE staff on the activities at the K-25 complex, they explained that two of the buildings housed enrichment activities up to 1% enrichment level and the third building housed activities up to the 3% enrichment level. The average enrichment for the materials to be processed at the MSC facility was estimated to be about 1.5 - 2%. The MSC dose assessment used uranium ratios that are consistent with the 1.5 - 2% enrichment.

- I.C.2.g Question: The MSC assessment stated that “any measurement attempts of the outer surface with a survey meter will be indistinguishable from background.” The technical basis for this statement was not provided. (Please provide the basis for this statement.)

Team Observation: In discussions with the MSC staff, they identified that the surface expression from the volumetric contamination in the finished nickel ingots would not be measurable due to the low energy of the Tc-99 beta and the density of nickel. The uranium is not expected to be present in the refined nickel even though it was considered present in the dose assessment to be conservative. The uranium is removed during pre-treatment at the Department of Energy (DOE) site prior to shipment and any residual uranium separates from the nickel into the slag during the melting process. The slag is removed and the waste material returned to DOE. The quotation in the question refers to the surface sampling of the end product. It does not apply to the description of the in process sampling protocol addressed in the response to the questions in II. below.

- II.A. Question: Although the plan describes several monitoring techniques, it did not specify which technique would be used to demonstrate compliance with the concentration limit. (Please identify the technique that will be used to demonstrate compliance with the concentration limit.)

Team Observation: MSC stated that every nickel cathode would be sampled (and analyzed) to demonstrate compliance with the concentration limit for Tc-99 and uranium in the final product (based on the 1 mrem/yr criterion). State staff stated that they require all licensees to demonstrate that materials being released from restricted areas comply with the guidelines of RG 1.86. Thus, MSC must also comply with this requirement. MSC follows a work instruction which uses wipe tests and surface monitoring to make this demonstration.

Question: The procedure does not provide information on efficiency, count times, detection limits, the use of tracers, spikes, quality control samples, etc. The sampling plan does not specify the minimum nickel sample to be collected (20 gram minimum for nickel analysis). (Please provide this detailed information.)

Team Observation: Additional information on sample analysis was provided at the meeting at the MSC site. MSC stated that they follow a State approved Phase I sampling plan which involves direct sampling and analysis of four samples from each nickel sheet. From each sample location, they will dissolve a one gram aliquot of the nickel cathode and perform gross alpha/beta counting using liquid scintillation counting (LSC). The sample analysis methodology appeared acceptable but the detection limits are high, 80-90% of the release limits. The team discussed this issue with MSC and the State. The State stated they would look into it further. Also, radiochemical yields have yet to be determined, and no information was available on the routine laboratory quality assurance/quality control program. A Tc-99 tracer was used in some analyses, but only to check the adequacy of the LSC cocktail. MSC indicated that work is still on-going in this area in developing a Phase II sampling plan. MSC appears to have the equipment and personnel to perform this activity in an acceptable manner. The IMPEP team reviewed the State process for approval of

sampling/monitoring programs including the detection limit question as part of the Technical Quality of Licensing indicator during the August 2000 IMPEP review. The licensing staff evaluates the adequacy of the limit being set and does not necessarily evaluate the licensee's ability to make the measurement. The inspection staff then inspect the facility to determine their compliance with the release level. If the licensee cannot demonstrate compliance due to insufficient detection or measurement capability then the licensee will be cited for non-compliance with the release level and will be required to come into compliance.

- II.B. Question: The relationship between this plan and the other MSC "Work Instructions" for conducting surveys is not clear from the information provided. The available information does not describe how each method of radioactivity monitoring (swipes, hand-held surveys using portable instruments, automated monitoring using a conveyor system, and destructive sampling and analysis of the final ingot) will work together in a comprehensive survey program for ensuring that the nickel ingots will be released within the proposed criteria. (Please provide an explanation of the relationship between the sampling plan and the work instructions. This should include a specification of the actions necessary to demonstrate compliance with the release limits.)

Team Observation: There is no apparent relationship between the sampling plan and the work instructions. The work instructions are the standard instructions used for conducting surveys in other areas of the MSC facilities, although one work instruction for conducting surveys to demonstrate compliance with RG 1.86 would be applicable to the nickel operations. MSC's use of this work instruction for other work activities has been found acceptable by the State. MSC personnel stated that the final nickel product would be released based on the Phase I sampling plan and sample analysis results which are separate from and not covered in the current work instructions. As discussed above in II.A., MSC is further developing its sample analysis procedures (i.e., Phase II) for demonstrating compliance with the 3 Bq/g for Tc-99 and 0.3 Bq/g for uranium limits.

Question: The sampling plan does not specify when the Phases in the sampling plan will be implemented. (Please provide the description of the sampling Phases as they relate to the decontamination process and release of the nickel.)

Team Observation: Based on the presentation by MSC, the phases of the sampling plan may not be relevant. The Phase I sampling will continue until the State approves transition to Phase II or some other sampling procedure. As currently approved, Phase I sampling involves direct sampling and analysis of four samples from each nickel cathode sheet.

MSC presented data indicating that anolyte analysis results would probably be a good parameter to use for controlling the quality of the final product. MSC discussed the consideration of process controls as an indicator that the nickel was produced within the release limits; however, this process will not be an issue from a regulatory viewpoint unless MSC requests a license amendment for use of this technique in lieu of Phase I or Phase II sampling. Process control may help MSC produce a high quality product in an efficient manner, but demonstrating compliance with the release

limits will be done by Phase I cathode sample analysis results based on the current license conditions.

Question: There were no Phase I data provided to support the adequacy of the Phase II sampling plan. The review team had additional detailed questions on how the various monitoring methods relate to the release criteria, and how background and minimum detectable activities (MDAs) for the sampling program would be determined. (Please provide the available data and explanation for the areas listed above.)

Team Observation: Initial Phase I data were presented by MSC at the April 10, 2000 meeting. The Phase I data indicated that Tc-99 was not uniformly distributed throughout the cathode. Therefore, the cathode would be sampled at four locations, but during any production runs the licensee would like to only take one sample from the cathode. MSC personnel stated that a process modification was possible to ensure the uniformity of the Tc-99 distribution in the cathode. The State staff indicated that the transition from Phase I to Phase II (one sample per cathode) would only occur after approval from the State.

- II.C. Question: It was not clear to the review team whether sampling the plating bath was going to be part of the overall survey program for ensuring compliance with the proposed release criteria. The review team did not see documentation that demonstrated this sampling represented the nickel contaminate levels. The review team felt that a more comprehensive survey program should be used while MSC gains experience with this new process. The review team did not identify procedures for the analysis of samples taken from slag or the plating bath, or the acceptance criteria for the results of the analyses. (Please provide an explanation and documentation for the use of the plating bath and slag sampling.)

Team Observation: Although MSC is evaluating the benefit of analyzing the plating bath solutions, the plating bath analytical results will not be used to demonstrate compliance with the release limits under the approved Phase I sampling plan. Only the results of cathode sampling at four locations will be used to demonstrate compliance with the release limits. Slag sampling is not conducted under the Phase I or II sampling plan since the slag from the vacuum induction furnace will be returned to DOE. The team did not look into the sampling and analysis for material inventory purposes.

MSC would like to use one sample from each cathode (Phase II sampling) to demonstrate compliance with the release concentration limits based on dose. State staff stated that MSC would also have to comply with the RG 1.86 limits, so surveys (for loose-removable contamination and/or fixed contamination) would have to be performed. Prior to approving a Phase II sampling plan, the State would review MSC's protocols, as discussed in II.B above.

- III. Question: There is no mention of a monitoring program for ensuring compliance with the special nuclear material (SNM) limits in the license (350 g of uranium-235, 200 g of plutonium, and 200 g of uranium-233) which are the maximum amounts an Agreement State can regulate. The review team had no documentation provided by TN to address this issue. (Please provide documentation for the program for tracking

SNM at the MSC site to ensure possession limits remain below those which an Agreement State may license.)

DOE staff indicated that MSC has an SNM tracking system in place including inventory controls. The review team believes this information needs to be confirmed. (Please provide a description of the MSC tracking system and actions TN conducts to verify that MSC is within its SNM limit.)

Team Observation: The review team verified that the MSC licenses contain a site limit for SNM that is the limit authorized under the Agreement. MSC discussed the tracking system (they use a spread sheet) that they have in place and that they ship wastes back to DOE to maintain their inventory below the limit. DOE has also audited the MSC site and found MSC's SNM tracking system acceptable. The State verifies that MSC has not exceeded its SNM limit as part of the routine inspections.

- IV. Question: The distinction between the two licenses issued to MSC is not evident from the documents provided. Clarification on the relationship between these licenses would be useful to the team. (Please provide an explanation of the relationship between the two licenses.)

Team Observation: Based on discussions with the State staff, the main difference between licenses S-01046-L00 and R-01078-L00 are in the authorized use and the facilities used. License No. S-01046-L00 was first issued as a source material license in the early 1980s, when MSC had only a single building and activities were limited to metallurgy and fabrication of items from depleted uranium (source material). As MSC's activities changed and grew, License No. R-01078-L00 was issued to cover activities with byproduct material, source, and SNM at MSC's new facilities. At this time, the list of authorized materials on both licenses are similar, but the authorized uses differ and locations listed in applications and letters submitted by MSC differ. Dual listing of authorized materials is necessary because many of the items contain both source and byproduct materials, and there is also interaction between the facilities and activities under both licenses as the items are processed by MSC. The limit for SNM applies to the total material possessed under both licenses.

- IV.A. Question: The review team could not determine what aspects of the MSC operations were evaluated through the inspections and other meetings with MSC. The lack of TN documentation of interaction with the licensee makes it difficult to evaluate the TN licensing process in this case. (Please provide any documentation of the meetings or other communication between TN and MSC, e.g. meeting minutes, letter exchanges, or telephone notes.)

Team Observation: The State staff and MSC staff discussed meetings and telephone conversations that occurred as part of this licensing action, but were not documented. This questions was also discussed in I.C.2.a above. The issue of documentation of communications between the regulator and the licensee was further reviewed during the IMPEP review performed in August 2000. Review of licensing files, other than MSC's, identified some licensing actions that included documentation of telephone conversations and meetings. However, based on discussions with State license reviewers and supervisors, such documentation is not required and not always done.

Although NRC strongly encourages such documentation of communications by its own staff, this is not a specific provision that the NRC can impose when relinquishing regulatory authority to an Agreement State.

- IV.B. Question: It is unclear whether these meetings were used to support the licensing decision since no documentation of the meetings was included in the information provided to the NRC. (Please explain the purpose of these meetings and provide any documentation on the meetings as requested in Item IV.A. above.)

Team Observation: Based on discussions with State staff and MSC staff, at least two meetings occurred as part of the licensing process for amending the license. The only documentation of these meetings are the letters dated January 18, January 29, and February 18, 1999 submitting additional information to the State as requested during the meetings held on December 8, 1998 at the State office and at the MSC facility on January 20, 1999, respectively. According to staff interviewed, at least two other meetings were held (one at MSC and one at the State offices) to discuss the license amendment request. Also, numerous telephone conversations were held. According to State staff, they may not keep records of all such telephone conversations or meetings, and no additional documentation of these activities are available. The meetings were held to gather information and to clarify information related to the license amendment request. Meetings at MSC allowed the State staff to have direct access to MSC technical staff and to review the facilities. The State staff stated that the information used in granting the MSC license amendment was the information in the file (the original application and supplemental information filed by MSC in response to the meetings and telephone requests). The review team considered the material in the file and concluded that there was sufficient information to determine that release limits proposed by MSC would not exceed the 1 mrem/yr dose criterion and that MSC has the capability to ensure that nickel sheets produced by their process would not be in excess of the release limits.

- IV.C. Question: The review team could not determine what information DOE would supply on the radiological analysis and radiation levels of the incoming nickel material that would be shipped to MSC from DOE. It could not be determined if other isotopes other than Tc-99 and U-234/235/238 would be allowed to be on the material or how much variation in the radioactivity content of the incoming nickel would be allowed. The review team could not identify if there were any restrictions (other than total SNM) on incoming material, in terms of radiation/radioactivity levels or expected concentrations. (Please provide an explanation of the controls on the nickel to be accepted at the MSC site addressing the above points.)

Team Observation: Based on interviews with State staff and MSC staff, the incoming nickel was used as part of the diffusion barrier at the K-25 complex where recycled uranium was re-enriched. Although the uranium was purified prior to enrichment, small quantities of other radionuclides were present in the uranium. This barrier did not trap significant quantities of radionuclides other than uranium, and Tc-99 because of the affinity for Tc-99 by the diffusion barrier. The nickel is pre-treated at the DOE site prior to shipping of the nickel to MSC. This pretreatment limits the amount of uranium and other radionuclides on the nickel, but is not effective for removal of the Tc-99. The nickel was tested for other radionuclides and no significant concentrations

were identified. There are no additional restrictions on the incoming nickel except that the material be within the possession limits of MSC's licenses.

- IV.D. Question: The license conditions specifying the concentration and surface limits can be interpreted to authorize MSC to release the nickel with removable surface contamination at the limit, plus volumetric contamination at the limit. How this condition is interpreted can affect assumptions that should be made in the dose assessment. Clarification on this condition is needed. (Please provide clarification on how this condition should be interpreted.)

Team Observation: Based on conversations with State staff, the license condition does in fact require that the nickel ingots released meet both the volumetric contamination limits specified in the license condition, and the removable and fixed surface contamination limits described in RG 1.86. State staff determined that the volumetric limits assure that no member of the public receives a dose that exceeds the 1 mrem/yr criterion. State staff believe that the dose from surface contamination would be insignificant. In addition, State staff and MSC staff believe that it is highly unlikely that removable surface contamination will exist on the refined nickel ingots. However, State staff stated that all materials released from the MSC site would be required to meet RG 1.86 surficial limits as well as the 1 mrem/yr dose criterion.

Attachment:
As stated