

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE PAGE OF PAGES 1 2

2. AMENDMENT/MODIFICATION NO. M002 3. EFFECTIVE DATE See Block 15C. 4. REQUISITION/PURCHASE REQ. NO. RES-01-065, 2/19/02 5. PROJECT NO. (If applicable)

6. ISSUED BY U.S. Nuclear Regulatory Commission Div of Contracts and Property Mgmt Two White Flint North - MS T-7-I-2 Contract Management Branch No. 1 Washington, DC 20555 7. ADMINISTERED BY (If other than item 6) U.S. Nuclear Regulatory Commission Div of Contracts and Property Mgmt Two White Flint North - MS T-7-I-2 Washington, DC 20555

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code) SC&A, Inc. ATTN: Mr. Sanford Cohen 6858 Old Dominion Drive Suite 301 McLean, VA 22101 9A. AMENDMENT OF SOLICITATION NO. 9B. DATED (SEE ITEM 11) 10A. MODIFICATION OF CONTRACT/ORDER NO. NRC-04-01-065 10B. DATED (SEE ITEM 13) X 07-16-2001

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers is extended, is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning copies of the amendment; (b) By acknowledging receipt of this amendment of each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required) B&R No.: 26015304223 Job Code: Y6407 BOC: 252A APPN No.: 31X0200.260 OBLIGATED AMOUNT: \$168,000.00

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(X) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b). C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: D. OTHER (Specify type of modification and authority) Supplemental Agreement X Mutual agreement of the parties

E. IMPORTANT: Contractor is not, X is required to sign this document and return 2 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

SEE ATTACHED PAGE FOR MODIFICATION DETAILS

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print) Sanford Cohen, President 15B. CONTRACTOR/OFFEROR (Signature of person authorized to sign) 15C. DATE SIGNED 5/8/02 16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Mary H. Mace 16B. UNITED STATES OF AMERICA BY (Signature of Contracting Officer) 16C. DATE SIGNED 4-30-02

TEMPLATE-ADM001

ADM02

The purpose of this modification is to: (1) increase the scope of the contract for additional work, in accordance with the attached Statement of Work, (2) increase the contract ceiling amount by \$170,380.00 from \$297,654.81 to \$468,034.81, and (3) increase the obligated amount by \$168,000.00 from \$297,654.81 to \$465,654.81. Accordingly, the contract is hereby modified as follows:

1. The attached Statement of Work provides the additional work that the contractor is required to be performed as a result of award of this modification.
2. Under Subsection B.3, "CONSIDERATION AND OBLIGATION-COST PLUS FIXED FEE (JUN 1988) ALTERNATE I (JUN 1991), paragraphs (a), (c), and (d) are DELETED in their entirety and SUBSTITUTED with the following in lieu thereof:
 - "(a) The total estimated cost to the Government for full performance of this contract is \$468,034.81, of which the sum of \$433,365.30 represents the reimbursable costs, and \$34,669.51 represents the fixed fee."
 - "(c) The amount obligated by the Government with respect to this contract is \$465,654.81. of which the sum of \$428,402.43 represents the reimbursable costs, and of which \$37,252.38 represents the fixed fee."
 - "(d) It is estimated that the amount currently allotted will cover performance through through July 15, 2002."

A summary of obligations fro this contract, from award through the date of this action, is provided below:

Total FY01 Obligation Amount:	\$200,870.00
Total FY02 Obligation Amount:	\$264,784.81
Cumulative Total of NRC Obligations:	\$465,654.81

This modification obligates FY02 funds in the amount of \$168,000.00.

All other terms and conditions of the contract remain unchanged.

STATEMENT OF WORK FOR MODIFICATION NO. 2
UNDER CONTRACT NO. NRC-04-01-065

TITLE: NUREG-1640 Finalization: Radiological Assessments for Clearance of Equipment and Materials from Nuclear Facilities

I. INTRODUCTION

This statement of work (SOW) is designed to provide technical assistance for resolving comments on NUREG-1640, Radiological Assessments for Clearance of Equipment and Materials from Nuclear Facilities and for preparing the publication-ready manuscripts and other materials for final publication. Specifically, this SOW for Modification 2 covers additional work that was anticipated, but unknowable at the time of award, because work had to proceed to specifically reveal the exact tasks.

II. BACKGROUND

In Section 2.2 of the original Statement of Work (SOW) for the subject contract, NRC stated that:

"(t)he following is the NRC staff's summary of the major significant comments requiring technical assistance. Additional work may be revealed in the course of responding to the comments, however proposals should be based on the following summary with the contingency listed in 2.1.6 above."

A total of twenty-seven major significant items that require additional work have been identified. These are listed in Section IV., of this Scope of Work.

The general contextual background of this contracting effort follows and is identical to that in the original SOW.

In March 1999, the U.S. Nuclear Regulatory Commission (NRC) published, in the Federal Register (64 FR 14952), a notice of availability of the draft report, Radiological Assessments for Clearance of Equipment and Materials from Nuclear Facilities, NUREG-1640, for review and comment. NUREG-1640 contains methods for translation of concentrations of radioactivity in or on certain metals and concrete into radiation dose as a result of clearance of these materials. More detail about this document can be found in SECY-00-0070, Attachment 3, Section C (March 23, 2000). No final submission date for comments was set to allow for comments that might be received during the ensuing public workshops and subsequently.

On June 30, 1999, the U.S. Nuclear Regulatory Commission (NRC) published, in the Federal Register (64 FR 35090), an Issues Paper indicating that the NRC was examining

its approach for control of solid material and invited written and electronic comment on the paper. To provide further opportunity for public input, the NRC held a series of public meetings during fall 1999 at four locations around the country, as announced in the Federal Register Notice.

Comments from these meetings included allegations that NUREG-1640 was "tainted" because of an apparent organizational conflict of interest. As a result of this latter comment, NUREG-1640 underwent an independent technical review by the Center for Nuclear Waste Regulatory Analyses (CNWRA). Additionally, the Commission has sought the views of a National Academies' National Research Council subcommittee on, among other things, the sufficiency of the technical bases for the establishment of criteria for controlling the release of slightly contaminated solid materials. Specifically included are an evaluation of: methods to identify the critical groups; exposure pathways(s); assessment of individualdose; and exposure scenarios. Finally, the NRC staff has comments on the report.

While the National Academies' subcommittee report is not expected until early 2002, the Commission has directed the staff to continue the development of the technical bases to assist them in the decision on whether to proceed with rulemaking. A critical step in this development is the finalization of NUREG-1640.

III. OBJECTIVE

The objective of Modification No. 2 is for the contractor to provide additional analyses and technical assistance for individual dose assessments for the clearance of materials and equipment. Specific design objectives of the work are described below in the Scope of Work.

IV. SCOPE OF WORK

1. **Broad overview of work to provide analyses and technical assistance**

The broad overview of work for this contract modification remains the same as the original contract and are repeated below for clarity.

The contractor shall submit a final revised manuscript suitable for publication as NUREG-1640. The final report shall include estimates of individual doses associated with the clearance of ferrous metals, copper, aluminum, concrete and equipment for reuse as addressed in the draft NUREG-1640, supporting documentation, and the technical basis for those estimates. The report shall include the incremental information used in the calculations, including: background information and data, references, mathematical formulations, rationales for parameter selections, and results in a manner consistent with the style and format of the NUREG-1640. Basic design objectives listed below shall apply to all calculations and reports.

The scope of work is categorized into establishment of a Quality Control and Quality Assurance Plan and a Peer review plan (See XII below.); technical assistance on the resolution of comments including calculations as appropriate (See IV., 2., below); and preparation of the ready-for-publication manuscript and electronic files and delivery of the Quality Control Engineering Design Files (See IV., 3., below.).

Calculational tools that were used to create the draft NUREG-1640 should be used to perform the work in this contract. These tools include: MCNP, EXCEL, and Crystal Ball. To the extent practical, calculational work done under this SOW shall be performed in an EXCEL® 2000 spreadsheet format.

2. Design objectives for analyses

The general design objectives for analyses of work for this contract modification remain the same as the original contract, but are repeated below for clarity.

2.1 General

- 2.1.1 The analyses shall use to the fullest extent appropriate the draft NUREG-1640 methods. For the final publication, only the changes required for resolution of comments shall be deemed necessary. However, it is recognized that the final NUREG-1640 will have revised tables and is likely to have new or expanded tables. The format and content of the draft are to be followed to the maximum extent practicable.
- 2.1.2 The level of detail of assumptions and parameters used shall be commensurate with the resolution of the models and calculational methods used. The contractor shall not unnecessarily refine data. The analyses usually shall be sufficiently general to apply to a broad range of similar real-life situations, but not so inclusive that they are bounding or overly conservative.
- 2.1.3 Analyses shall include complete descriptions, references for data used, and rationales for assumptions and approaches. Complete descriptions include scenarios, models, intermediate results such as material flow in by-products, dose factors from the respective exposure pathways, and associated uncertainties. Technical assistance shall include clarification of analyses and rationales by telephone conversations, meetings, and written communications.
- 2.1.4 The calculations shall be designed to be:
 - (a) realistic, i.e., based on current industrial conditions
 - (b) probabilistic
 - (c) reported as means and 5, 50, and 95th percentiles

(d) probabilistically calculated dose factors for each significant exposure pathway in each scenario shall be reported in NUREG-1640 in the appendices.

- 2.1.5 Sensitivity analyses shall be performed and reported in NUREG-1640 to indicate which input factors are most important with respect to uncertainty. The objective is to indicate where specific research or data collection would be most effective in reducing uncertainty.

2.2 Specific comments requiring work

The following is the NRC staff's summary of the major significant additional work requiring technical assistance in contract Modification 2.

1. **Need to incorporate short-lived progenies.** Draft NUREG-1640 did not include short-lived progenies in the Federal Guidance Report (FGR) 12 dose coefficients of the parent radionuclides. By design, FGR 12 tabulates the doses from exposure to a parent nuclide separately from those of its progeny. For instance, the dose coefficients for Cs-137, which is a pure β -emitter, only include the weak Bremsstrahlung radiation from the β -particles, and do not include the far more powerful (rays emitted by its short-lived daughter, Ba-137m. However, Ba-137m, which has a 2.6-minute half-life, is in secular equilibrium with Cs-137. Correcting this omission requires changing the dose coefficients of about 19 radionuclides which are used in 25 exposure scenario spreadsheets.
2. **The size of the slag pile used in the slag leach scenario is inconsistent with the throughput of the steel mill in other Draft NUREG-1640 scenario.** A consistent set of assumptions regarding slag generation and material throughput needs to be developed and incorporated in all steel recycling scenarios.
3. **An expanded scope to address the "Small Object Close to the Body" scenario.** SOW Item 2.2.27 directs the re-evaluation of the use of deep dose equivalent for this scenario, using the geometry described in Draft NUREG-1640. Further analysis of this issue indicates that the effective dose equivalent may vary with the location and size of the object. It is therefore necessary to perform generic scoping calculations which serve to represent a number of different candidate "small objects" (e.g., jewelry, eye glasses, etc.) worn in different locations with respect to the body, with different exposure times, geometries, etc. The generic scoping calculations are to identify the most probable and realistic object and situation that would lead to the greatest dose. Once that scenario is identified, then a more detailed dose assessment, in keeping with other scenarios, shall be conducted and reported in detail in the final NUREG-1640.
4. **An expanded scope to address the automobile occupant scenario.** SOW Item 2.2.30 directs the revision of "the geometry and mass of the passenger vehicle and revise the scenario and calculations as appropriate to ensure more accurate realism or more defensible rationale." An analysis of the comment indicates a need to expand the analysis to examine a number of different candidate components. As is the case for the

"Small Object Close to the Body," discussed above, this will require scoping analyses which in turn are likely to indicate a need to model more than one component to assess the critical group for different radionuclides.

5. The "mixing factor" for contaminated scrap (i.e., scrap dilution factor) was based on assumptions regarding the clearance of contaminated materials from nuclear power plants. These assumptions are inconsistent with new information developed under Contract No. NRC-04-01-049: Technical Bases Information for Clearance of Materials and Equipment. This finding requires the development of a new basis for developing a distribution of mixing factors for cleared materials, which requires a re-examination of existing inventory data, an analysis of data obtained from DOE, ORISE, and NEI, and further study of the PNL NUREG/CR reports on decommissioning and other sources.

6. A number of comments raised issues related to landfill disposal. Draft NUREG-1640 modeled a municipal landfill; however, industrial landfills are currently used for disposal of cleared materials. It is therefore necessary to repeat the analyses of the landfill disposal scenarios for industrial as well as municipal landfills. Due to the new parameters for scrap mixing, and inconsistencies in the landfill parameters described in Draft NUREG-1640, it is also necessary to re-evaluate all four landfill resident scenarios (three for steel scrap and steel by-products, and one for concrete). Furthermore, it is necessary to review the basis of the Draft NUREG-1640 landfill data, which is for the 1986 - 1990 time period.

7. In response to a CNWRA comment, we evaluated the absorption of large particles (10 :m < AMAD < 100 :m) via the nasopharyngeal dose pathway. The preliminary findings indicate a need to add this pathway to the dose assessment of certain scenarios involving soluble aerosols.

8. Published documentation for the berthing arrangements and occupancy times to support the "sailor living aboard ship" scenario specified in SOW Item 2.2.16. In addressing this SOW item, the contractor proposed patterning the exposure scenario on the EPA TSD, which provided documentation drawing on the professional knowledge and experience of a retired naval officer. The additional research needed to document this analysis involves a level of effort above that contemplated in their proposal.

9. Internal exposure should be included in the truck driver scenario. The transportation scenarios need to be re-examined to include internal exposure pathways, as appropriate. The Draft NUREG-1640 transportation worker scenarios only addressed the external exposures of the drivers to the loads of contaminated material. One of the comments pointed out that the drivers may also be subjected to internal exposure from resuspended particulate matter during loading and unloading. This pathway needs to be evaluated and included in the dose assessment if it judged to make a significant contribution to the dose. Special attention shall be given to slag and concrete scenarios.

10. **End-user scenarios should include a heavy equipment operator.** The contractor needs to perform a limited scoping calculation to determine if such a scenario could be limiting. This will be performed in a manner similar to examining the various components of an automobile, as discussed in Item 4 on page 2 of this letter.

Items 13 to 23, below, are based on the review of Draft NUREG-1640 by CNWRA. All quotations are taken from this report.

11. ". . . **the slag storage scenario only considers the drinking water pathway from a contaminated well It would seem reasonable to include the ingestion pathway from a home garden irrigated with contaminated well water.**" The NUREG-1640 analysis of this scenario comprises a single pathway: the consumption of drinking water from a well down-gradient from a pile of slag stored at a recycling facility. A scoping analysis is required to determine if the additional pathway needs to be included in the analysis of this scenario.

12. **Home-grown animal foods should be included in a scenario modeling airborne radioactivity-to-food transport (in a rural setting).** The response to this comment requires an investigation to determine if this practice is sufficiently prevalent to constitute a critical group. If so, the pathway needs to be included.

13. **"The draft NUREG indicates that a small fraction of EAF baghouse dust is used as fertilizer for crops to be consumed by humans. However, the analysis of dose from the baghouse dust stops at the transport of the dust to the fertilizer manufacturer. . . . The draft NUREG would be clearer if it discussed all pathways considered and indicated the rationale for screening pathways from the final analyses."** A scoping analysis is needed to determine if such a scenario could be limiting. If so, a full analysis would be required.

14. **"The external exposure pathway only considered the dose contribution from gamma ray and Bremsstrahlung. Dose contributions from beta particles were not considered. There are several radionuclides analyzed in the draft NUREG that emit beta particles with significant energies."** A screening calculation of the β -ray dose to the skin needs to be performed for the equipment reuse scenario to determine if this constitutes a significant pathway. This pathway is expected to be significant for those radionuclides, such as Sr-90/Y-90, which emit energetic β -particles but very weak photons.

15. **"The draft NUREG indicates that the landfill resident scenarios were judged to be too unlikely to be used in the determination of the limiting concentrations for the release of contaminated materials. It is not clear why this scenario was considered too unlikely to be used in the determination of limiting concentrations for the metal scenarios but not the concrete scenario."** This comment, insofar as it concerns the steel scrap analysis, is addressed by SOW Item 2.2.39. Further study is required to address the inclusion of the landfill scenario in the concrete analysis.

16. **The dose conversion factors for the oxide form of the radionuclides were used in the calculation of dose in Draft NUREG-1640. The oxide form of the radionuclide does not always yield the limiting dose for the radionuclide and can be as much as a factor of 100 lower than the limiting chemical form.** The chemical form of each radionuclide in each scenario must first be determined, based on physiochemical considerations. The appropriate dose conversion factor (DCF) for each nuclide for each internal exposure pathway must then be selected. This requires re-examining and changing as appropriate, the DCF's which are used in every exposure scenario spreadsheet.

17. **Separate geometry factors should be calculated for the four materials studied in NUREG-1640 "for all scenarios in which the contaminated object provides a significant amount of self-shielding."** SOW Item 2.2.12 specifies the recalculation of geometry factors for the scrap transport scenario, including the use of specific materials—steel, copper, aluminum, and concrete—for the respective scenarios. By the same logic, additional geometry factors are required for the transport of slag and of refined metal products—the latter will have a different load geometry than scrap metal. Similarly, the transport of copper and aluminum products and byproducts will require separate models. Finally, other copper, aluminum, and concrete exposure scenarios will require separate geometry factors. As an illustration, for 100 keV photons the half-value layer (HVL) of aluminum is about 15 mm, while the HVL of copper is about 1.7 mm, or nine-fold thinner. Clearly, for objects of the same dimensions, the radioactive contaminants distributed in an aluminum object will undergo far less self-absorption than in the copper one.

18. **"The mass and elemental partitioning analyses performed in the report for the copper processing . . . are based on the primary smelter process and are therefore not applicable to the copper recycling in a secondary smelter."** In responding to this comment, it became apparent that the materials flow model for copper needed to be revised, which entails a complete revision of copper elemental partitioning factors. Aluminum partitioning ratios likewise require revision.

19. **The analysis should be expanded to include 42 nuclides from the European Commission's "Radiation Protection No. 89," which were not included in NUREG-1640.** In the course of incorporating additional radionuclides, inconsistencies were uncovered in the analysis of the ingrowth of radioactive progenies. This requires a significant change in the structure of the spreadsheets.

20. **An update of the radioactive decay data is required.** The addition of the 42 radionuclides requires the incorporation of radioactive decay data for these nuclides. It would be inconsistent to use current data for the analyses of these nuclides, while continuing to use the data in Draft NUREG-1640, which are based on much earlier sources, for the nuclides in the original report. This update first requires a search of the databases included with the Table of Isotopes, as well as those on the World-Wide Web maintained by the Isotopes Project of the Lawrence Berkeley National Laboratory and

the Evaluated Nuclear Structure Data Files maintained by the Brookhaven National Laboratory. It is then necessary to change the decay data—half-lives and branching ratios—which are used in every exposure scenario spreadsheet.

21. ". . . **[Draft NUREG-1640] does not provide adequate information for an independent determination of the effectiveness of the QA program.**" Section 8 of Draft NUREG-1640 needs to be revised in response to this comment.

22. **An industry source commented on the spread of values among the surficial dose factors for the four different materials—ferrous metals, aluminum, copper, and concrete.** The issue stems from calculating mass-based dose factors and then converting to surficial factors, based on the surface-to-mass ratios of each material. The surficial dose factors in the pre-melt scenarios need to be calculated independently of the mass-based factors. This will most likely require two or three additional scenarios, since the internal exposures would be directly linked to the areal activity concentrations.

23. **A health physicist who works with the steel industry, pointed out that there could be a buildup of activity in steel due to recycling of BOF dust.** For those radionuclides that partition to the dust, some buildup is expected. A preliminary scoping analysis has indicated a need to incorporate this effect in the scenario spreadsheets.

24. **Several comments raised questions about the elemental partitioning factors developed for the steel recycling scenarios.** A review of the steel partitioning factors revealed a need to revise these factors for several elements.

25. **Several comments requesting clarification of the text indicate the need for substantial editorial revisions of Draft NUREG-1640.** This requires an expansion of the task specified in SOW Item 2.2.33, which was limited to a number of relatively minor corrections and editorial changes.

26. **SOW Item 2.2.40 specified the recalculation of dose factors using dose conversion factors consistent with ICRP 60 [ICRP 66, 68, and 72].** An up-to-date data set available from Oak Ridge National Laboratory is a new set of dose coefficients for external exposure, based on the ICRP 60 organ-weighting factors. Thus, an additional data set incorporating these factors must be included in the spreadsheets. More important, two sets of external exposure geometry factors are required, one using the ICRP 51 fluence-to-dose coefficients, which are based on the ICRP 26 weighting factors, and another based on ICRP 74, which uses the ICRP 60 factors. This will require an additional set of MCNP calculations.

27. **Document Draft NUREG-1640 parameter values and distributions.** A number of comments questioned parameters and assumptions used in the Draft NUREG-1640 analyses. In addition to the revisions to the analyses specified in the SOW, and the additional resolution of comments discussed in Items 1 - 28, above, the final NUREG-1640 must contain citations for parameters and modeling assumptions. Changes from

those used in the draft NUREG-1640 shall be fully documented and cited. Where there are no changes from the draft, the level of documentation and citation in the draft is acceptable. All supporting documentation, other than that in publicly available published sources, related to changes of the draft NUREG-1640 for the finalization shall be readily accessible in the project Engineering Design Files (EDFs). EDFs for analyses that are changed in this contract shall provide a linkage by reference to those EDFs that were developed by SAIC, the previous contractor. The purpose of this linkage is to enable an independent reviewer to trace the entire development of the final NUREG-1640 in the SAIC and SC&A EDFs.

V. REPORTING REQUIREMENTS

Reporting requirements for this modification remain the same as those under the original contract; however they are repeated below for clarity.

3. Monthly letter status reports shall report the monthly level of effort by various levels of pay, the technical work performed corresponding to the billing, technical and administrative issues, a log of the expenditures, and a projection of the spending plan by sub-task. Vouchers billing work performed shall be preceded by or accompanied with a monthly letter status report corresponding to and accounting for the billing. The monthly letter status report shall break down the number of hours billed and percent of effort by staff level corresponding to the billing. Project spending plans and billings shall be at the sub-task level. The monthly letter status report or billing shall include a tracking of the spending plan, a cumulative accounting of the spending, as well as the current billing. The monthly status letter report shall include a section that clearly identifies issues, difficulties, needed decisions on the part of the NRC Project Officer, and financial concerns.
 - 3.1 The technical lead or contractor Manager shall provide a weekly telephone update to the NRC Project Officer or his designee(s) on the detailed status of the work performed.
 - 3.2 Analyses for inclusion in published reports shall be explicitly reported in NUREG format, technically edited and publication ready, complete with background information, elaboration of rationales used, methods transparent to the reader, and reproducible by the reader. Letter reports and intermediate reports shall be submitted in both hard copy and electronically. Word processing submissions shall be in WordPerfect® version 8 or greater; spreadsheets in EXCEL® 2000 with design specifications sufficient to enable implementation in different spreadsheet software or in later versions. Monte Carlo realizations shall be performed with Crystal Ball® version 4.0g or greater in conjunction with the EXCEL® spreadsheets. Other electronic formats shall be unacceptable, unless first agreed upon in writing by the NRC Project Officer. Summary tables in letter reports and other communications may be submitted in spreadsheet format. Engineering Design Files (EDFs) shall follow the format of the original SAIC EDFs to document the development of the analyses, changes, and the Quality Control and Quality Assurance processes.

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- 3.2.1 The final reports for publication shall be delivered in WordPerfect®, version 8 or greater electronic format, with one camera-ready, single-sided version, and three double-sided copies. Submission of manuscripts for publication in the NUREG series shall comply with the requirements for submission to the NRC's Agency wide Documents Access and Management System (ADAMS). Other electronic formats shall be unacceptable, unless first agreed upon by the NRC Project Officer.
- 3.2.2 The contractor shall plan on two complete drafts for two rounds of review, including two rounds of peer review, and comment prior to finalizing the report.
- 3.2.3 The reports' styles shall be the same as for the draft NUREG-1640 with the intent that they will be companion reports. Submission of manuscripts for publication in the NUREG series shall comply with the requirements for submission to the NRC's Agency-wide Documents Access and Management System (ADAMS). Other electronic formats shall be unacceptable, unless first agreed upon by the NRC Project Officer.
- 3.2.4 Analyses shall be performed with EXCEL® and Crystal Ball® spreadsheet files and shall be deliverable in virus-free, electronic medium format with the hard copy reports. Complete documentation of the MCNP run parameters shall be in the EDFs, as well as the scoping and verification calculations done in Microshield or in other virus-free, electronic program formats. Complete virus-free, electronic files that would enable the staff to reproduce calculations or calculational runs shall be part of the deliverables, including data files, source codes, input/output and code processing programs. Commercially available software are excluded from this deliverable requirement.

VI. DELIVERABLES AND DELIVERY SCHEDULE

Deliverables and delivery schedule under the original contract shall remain the same with the following exceptions:

The Quality Management Plan shall be due February 13, 2002.

The letter report on cupola and induction furnaces shall be due May 12, 2002.

The analysis of the nasopharyngeal exposure pathway shall be due May 12, 2002.

The scoping analyses of the sailor and the tuba player shall be due May 12, 2002.

The draft final NUREG-1640 shall be due June 1, 2002.

The Peer Review of the draft final NUREG-1640 shall be complete and due by July 1, 2002.

The revised Final NUREG-1640, camera ready, shall be due July 14, 2002.

The Engineering Design Files, complete with virus-free, electronic copies of the spreadsheet workbooks, as appropriate, shall be due July 14, 2002.

VII. MEETINGS AND TRAVEL REQUIREMENTS

4. PROGRAM COORDINATION AND REVIEW MEETINGS

Program coordination and review meetings remain unchanged from the original contract.

VIII. LEVEL OF EFFORT

Level of effort shall be separated into professional (technical and managerial) and clerical for up to six sub-categories specifically for each task. Effort for writing and transmitting monthly letter status reports shall not be separately stated, rather that effort shall be integral to performance of the tasks.

The level of effort for Modification No. 2 is 1,740 hours.

IX. PERIOD OF PERFORMANCE

The period of performance for Modification No. 2 shall commence on the effective date of and expire on July 15, 2002.

X. TECHNICAL DIRECTION

Robert A. Meck is the NRC Project Officer.

XI. PUBLICATIONS

Publication of work under this contract in peer reviewed journals is encouraged, with approval of the NRC Project Officer. However, the costs of such publications is not a part of this contract and shall not be reimbursed by the NRC, unless a contract modification specifically provides for such costs.

XII. QUALITY ASSURANCE & QUALITY CONTROL (QA/QC)

The Quality Assurance and Quality Control requirements remain unchanged from the original contract and are repeated below for clarity.

5. At the outset of the contract the contractor shall provide a QA/QC plan or procedure to the NRC Project Officer for approval. The contractor shall actively maintain and keep current a formal QA program for all analyses as described in Section 8 of the draft

NUREG-1640. QC files shall be kept current and maintained in Engineering Design Files that are deliverable following termination of the contract. In the event that this Statement of Work is subdivided and awarded to more than one contractor or subcontractor, a standard QA/QC plan shall be used by all contractors and subcontractors. The award for quality coordination, oversight, documentation and audits of all quality activities by all contractors and subcontractors shall be awarded to a single contractor that will, in turn, coordinate the quality activities with the NRC Project Officer.

6. The contractor shall subcontract for independent peer reviews of the analyses performed under this contract. Prior to award of the subcontract, the contractor shall submit a peer review plan and nominations, complete with qualifications of the nominees, for the approval of the NRC Project Officer. The contractor shall submit the finalized peer review plan to the NRC Project Officer. Any changes to the peer review plan after finalization, shall require written approval from the NRC Project Officer. The subcontractor shall maintain independence from the contractor's analyses, however the contractor may consult the peer review subcontractor for clarification of comments on the contractor's analysis. Different peer review subcontractors may be necessary for different parts of the analyses, depending on the qualifications of the peer reviewers. The peer reviews shall be timely so as not to adversely impact the schedule of deliverables and shall culminate with a letter report submitted to both the contractor and the NRC Project Officer.

XIII. NRC-FURNISHED MATERIALS

Copies of NUREG and NUREG/CR publications and draft reports generated for the NRC will be provided or made available to the contractor upon request. In addition, available information, reports, public comments on the technical bases, and the results of the CNWRA and NRC/NA reviews will be provided for information and consideration as they become available. Work products that incorporate NRC furnished materials, in whole or in part, shall be considered defensible and the responsibility of the awardee(s) of this procurement.

Work from previous contracts include:

- Project Quality Plan for Technical Assistance Support for Clearance of Materials and Equipment Project;
- Peer Review Plan;
- NUREG/CR User's Manual for the Spreadsheets Used to Develop the NUREG-1640 Analyses;
- Mill Scale and Process Water Letter Report;
- Electronic WordPerfect files for draft NUREG-1640;
- Electronic EXCEL files for spreadsheets used in draft NUREG-1640 calculations;
- Design Engineering Files from the development of draft NUREG-1640;
- Public and staff comments on draft NUREG -1640.

Work-in-progress from previous or parallel contracts include:

- Letter report on the available data on tonnage, types of scrap materials and equipment that are potentially available for clearance and the respective kinds and amounts of radioactivity associated with the materials and equipment.

XIV. QUALIFICATIONS OF KEY PERSONNEL

Minimum requirements for key personnel developing scenarios, models, and performing calculations under this contract are demonstrable, and significant scenario and model development in the specific area of or areas related to clearance of metals and concrete and calculations for those scenarios under a formal QA/QC program within two years prior to the request for proposal for this contract. Proficiency with MCNP and EXCEL must be demonstrated by a minimum of two key personnel, namely, the lead analyst and the individual who performs the independent quality control verification. Advanced skills with Crystal Ball is also required by these individuals.

A Quality Assurance Administrator, who is different from the Lead Analyst and verifier, is required.

Proficient skills in technical editing and advanced production for publication-ready manuscripts of NUREG documents are required.

XV. REFERENCES AND ATTACHMENTS

As cited in the text of this Statement of Work.