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January 19, 2010

MEMORANDUM TO: Michael F. Weber, Director
Office of Nuclear Material Safety
and Safeguards

THROUGH: Daniel H. Dorman, Director **/RA/**
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

FROM: Yawar H. Faraz, Senior Project Manager **/RA/**
Advanced Fuel Cycle Branch
Special Projects and Technical
Support Directorate
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

SUBJECT: FOREIGN TRIP REPORT FOR INFORMATION EXCHANGE ON MATERIAL CONTROL AND ACCOUNTING AND SAFETY/RISK ANALYSIS FOR THE ROKKASHO REPROCESSING PLANT; JAPAN; DECEMBER 9-20, 2009

Enclosed is a foreign trip report for information exchange regarding implementation of Rokkasho Reprocessing Plant's material control and accounting program and conduct of safety/risk analyses.

As mentioned in the enclosed trip report, the Division of Fuel Cycle Safety and Safeguards believes that the content of this report is not likely to be of interest to the Commission and recommends that the report not be forwarded to the Commission.

Enclosure: As stated

CONTACT: Yawar Faraz, NMSS/FCSS
(301) 492-3207

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U.S. NUCLEAR REGULATORY COMMISSION FOREIGN TRIP REPORT

SUBJECT

From December 9 to 20, 2009, Thomas Hiltz, Yawar Faraz, Kelli Markham, Dennis Damon and Tom Pham of the Division of Fuel Cycle Safety and Safeguards (FCSS) in the Office of Nuclear Material Safety and Safeguards (NMSS), traveled to Japan to conduct technical tours of the Rokkasho Reprocessing Plant (RRP) and the Tokai Reprocessing Plant (TRP) and to conduct information exchange in the areas of material control and accounting (MC&A) and safety/risk analysis applicable to RRP. The U.S. contingent also included a technical staff analyst from the Los Alamos National Laboratory, Dr. David Beddingfield, who has been working extensively with the Japanese in establishing the MC&A programs at RRP and TRP. The visit was coordinated and funded by the U.S. Department of Energy (DOE) in accordance with the DOE and U.S. Nuclear Regulatory Commission (NRC) reimbursable agreement on advanced fuel cycle.

DATES OF TRAVEL AND COUNTRIES/ORGANIZATIONS VISITED

Dates: December 9-20, 2009
Country: Japan
Organizations: 1) Nuclear and Industrial Safety Agency/Ministry of Economy Trade and Industry (NISA/METI), Japan's safety regulator for RRP and TRP; 2) Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan's safeguards regulator for RRP and TRP; 3) Nuclear Material Control Center (NMCC), contractor for MEXT; 4) Japan Nuclear Fuel Limited (JNFL), RRP's operating organization; and 5) Japan Atomic Energy Agency (JAEA), TRP's operating organization

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Enclosure

SENSITIVITY

Sensitive – Non-public

BACKGROUND/PURPOSE

DOE is conducting research and development (R&D) in the area of advanced fuel cycle including used nuclear fuel (UNF) recycling in the United States. Additionally, independent of DOE's activities, private industry entities have expressed interest in establishing domestic recycling facilities. In September 2007, the NRC established an interagency agreement (IA) on technical information exchange with DOE that allows NRC staff to use DOE funds to become familiar with UNF recycling technologies. Also under the IA, the NRC is to provide feedback to DOE concerning potential regulatory, safety, safeguards, and security issues associated with UNF recycling facilities. One of the tasks under the agreement is to participate with DOE officials on site visits of international facilities.

The purpose of this travel was for NRC staff specializing in MC&A and safety/risk analysis to: (1) discuss UNF reprocessing facility regulatory oversight experience with the regulators, NISA/METI for safety/risk assessment, and MEXT for MC&A; (2) discuss RRP design, construction and operational experience with JNFL; (3) observe the as-built RRP and TRP in operation; and (4) examine, to the extent allowed by Japanese requirements and procedures, safeguards and safety documentation and design features of the facilities. The visit provided NRC staff regulatory and technical insights concerning MC&A and safety/risk analysis issues that would be provided to DOE to inform its fuel cycle R&D activities. The visit also provided NRC staff information which it could use to leverage its ongoing efforts to develop the necessary regulatory infrastructure for future reprocessing facilities in the U.S. Attached are the agendas (Attachment 1), contact information of primary Japanese officials with whom the NRC staff conducted technical interactions (Attachment 2) and presentations and documents provided to the NRC staff during the visit (Attachment 3).

The visit was coordinated with DOE and funded under the IA.

ABSTRACT: SUMMARY OF PERTINENT POINTS/ISSUES

The discussions and tours gave NRC staff a better appreciation of the implementation of the MC&A program and conduct of safety/risk analysis associated with a large operating reprocessing facility. The discussions also allowed the NRC staff to gain regulatory insights and identify technical issues pertaining to MC&A and safety/risk analyses and other safety disciplines at an operating reprocessing facility that would be of interest to NRC and DOE. These are included in the Discussion and On The Margins sections of this report. The staff intends to request a similar visit to France in mid-2010 to transfer knowledge in other regulatory areas such as UNF waste management and environmental releases associated with reprocessing facilities.

DISCUSSION

Introduction

On December 11, 2009, the NRC staff met with NISA and MEXT in Tokyo and discussed their application of safety/risk analysis and MC&A requirements, respectively, to activities associated with RRP and TRP. NISA and MEXT also discussed their experiences in providing safety and

safeguards oversight, respectively, of the two plants. An interpreter arranged by the NRC facilitated the discussions.

On December 14, after receiving a historical overview of the Rokkasho site, the NRC staff visited the Public Relations Center. In the afternoon the NRC staff toured areas of the reprocessing plant (b)(4) (b)(4) (b)(4) On December 15 and 16, the NRC staff divided into two groups. One group discussed application of safety/risk analysis to RRP processes while the other discussed MC&A. On December 15, during the afternoon, the group discussing MC&A visited the on-site safeguards laboratory used by MEXT, RRP, and the International Atomic Energy Agency (IAEA). On December 16, during the afternoon, the NRC staff toured the radiation controlled areas of RRP including areas where: (1) incoming spent fuel assemblies are stored; (2) head-end operations are conducted including the cutting of spent fuel rods and dissolution of the spent fuel; (3) uranium and plutonium streams are purified; (4) plutonium stream is denitrated; and (5) plutonium product is stored. On the morning of December 17, the NRC staff conducted additional discussions in the area of safety/risk analysis. Two interpreters arranged by the NRC and one interpreter arranged by JNFL facilitated the discussions at RRP.

Ex 4

On December 18, the NRC staff visited the TRP operated by JAEA. After a brief introduction of activities conducted at TRP, the NRC staff toured the radiation controlled areas of the main plant where: (1) spent fuel separation and refining processes are conducted; (2) plutonium is converted to the final product; and (3) uranium is denitrated. In the afternoon, the NRC staff toured the vitrification facility where liquid high level waste is vitrified into a borosilicate glass form, placed in sealed stainless steel containers, and stored. (b)(4) (b)(4) (b)(4) After the tours, the NRC staff met with TRP staff to discuss safeguards applicable to TRP. An interpreter arranged by JAEA facilitated the discussions at TRP.

Ex 4

RRP Site/Process Description

From December 14 to 17, the NRC staff visited RRP operated by JNFL. (b)(4) (b)(7)(C)

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Safety/Risk Analysis

(b)(4)

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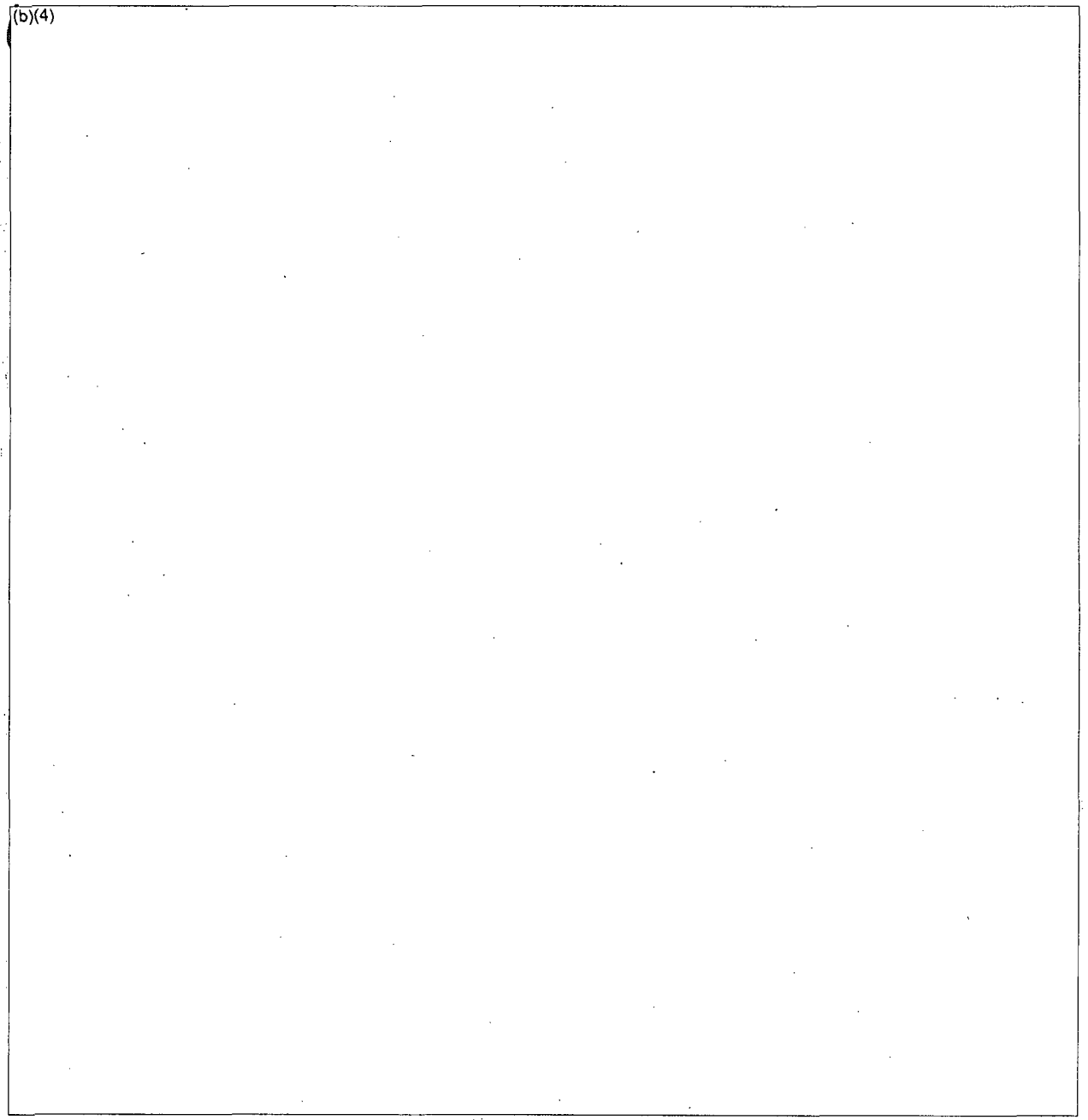

Ex4

Safeguards Discussion with Japan Safeguards Office

In addition to meeting with the officials in the NISA to discuss the nuclear safety for UNF reprocessing facilities in Japan, the staff met separately with officials of the Japan Safeguards Office (JSGO) to discuss safeguards implementation in Japan. JSGO, which is part of the MEXT, has the regulatory authority for implementing safeguards at reprocessing facilities pursuant to national and international requirements. Representatives of the NMCC also participated in the discussion. NMCC is an independent organization established specifically to support MEXT in meeting domestic and international requirements for safeguarding nuclear materials.

JSGO presented to the NRC an overview of the Japanese government's safeguards framework, including references to regulations and guidance documents for reprocessing facilities. Japan maintains a Comprehensive Safeguards Agreement under INFCIRC/153 with the IAEA through a State System of Accounting for and Control (SSAC) of all nuclear materials. This agreement stipulates the required reports by the SSAC to the IAEA on facility design, facility operations, material inventories, and inventory changes. These reports are the basis through which the IAEA conducts verification activities to ensure that nuclear materials are properly accounted for and controlled. The overall safeguards program consists of three parts: 1) establishment and maintenance of a reliable system of accounting and control of nuclear materials by the operating facilities, 2) verification information of material movements through containment and surveillance measures by the State authority, and 3) verification activities of all nuclear materials as facility recorded through inspections by the State authority. NMCC is the designated organization for the conduct of State safeguards inspections that are also carried out independently by the IAEA counterpart. NMCC also provides a centralized database management system for processing and evaluating all safeguards related information to be submitted to the IAEA. In addition, Japan participated in the Additional Protocol to the Safeguards Agreement under INFCIRC/540, and provided declarations in accordance with Articles 2 and 3 of the Additional Protocol to the IAEA.

Safeguards Program at RRP

JNFL safeguards representatives presented to the staff an overview of the material accountancy/safeguards program at RRP. Japan is a non-nuclear weapon state party to the Treaty on the Non-Profileration of Nuclear Weapons, and is obliged to accept international safeguards verification with the IAEA. This agreement stipulates first the process of a Design Information Examination (DIE), followed by a Design Information Verification (DIV) over a multi-year period of time, and continues with on-going physical inventory verifications, interim inventory verifications (IIVs), and short term inventory verifications (SIVs). The safeguards requirements are based on 100 percent independent verification of facility operations which result in excellent sensitivity to abrupt material diversion scenarios. Therefore, the international safeguards and domestic MC&A programs are much more intertwined in Japan than will be the case for a U.S. fuel cycle facility.

There are three components of the RRP safeguards program: (1) facility material accounting, (2) international safeguards verification, and (3) domestic compliance verification.

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The domestic compliance verification employs both the facility accounting data and the IAEA international verification data to confirm that results and values of each component system are consistent and accurate. Therefore, the practice of joint use of certain measurement equipment and instrumentation is observed at RPP with respect to cost savings and back-up advantages in case of equipment maintenance or failures.

The RRP safeguards staff also described the facility's safeguards and material accounting programs based on the 1988-1992 international Large Scale Reprocessing Plant Safeguards (LASCAR) Forum (IAEA publication STI/PUB/922, July 1992). This LASCAR system is the most recent and most relevant study of material accounting standards and best practices for reprocessing nuclear materials. The basic concepts of LASCAR are to establish an accurate and precise material accounting system, to achieve the timeliness detection goal, and to possibly reduce inspection efforts by introducing an unattended operation system comprising NDA and containment/surveillance measures. LASCAR was released in two versions – a shortened public release document and a more thorough controlled document. LASCAR was specifically commissioned to examine large-scale commercial plants, and provides an updated analysis of the technical findings for large scale reprocessing plant safeguards with regard to potential diversion of nuclear materials or misuse of the facility based on the material accounting program.

In addition, the RRP safeguards staff provided information related to how RRP has applied various material accounting measures and techniques to meet the LASCAR technical findings. Any new reprocessing facility would be expected to enumerate the methods of implementing the LASCAR technical findings at the proposed site. LASCAR major technical findings and implementation at RRP are summarized below:

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The RRP safeguards staff plans to provide to the NRC staff a listing of accountability measurement systems used at RRP, and will include typical measurement uncertainties associated with those systems. The staff noted that RRP possesses a state-of-the-art material accounting system, so this information will provide insight with respect to the practical limits of an MC&A safeguards system in a commercial reprocessing facility.

The RRP staff also discussed the inventory differences or MUF limits at reprocessing facilities. Currently, RRP can optimize their system to meet the LASCAR limit or the International Target Value limit. RRP staff noted that the current NRC limit in Subpart E of Part 74 is more stringent and could not practically be attainable by a large scale commercial reprocessing facility.

The RRP safeguards staff provided three useful reference documents for material accounting with regard to international standards and best practices for reprocessing facility. The RRP staff concluded the technical discussion by enumerating about the facility's current issues and further improvements in their safeguards program implementation.

On-Site Laboratory Visit at RRP

The staff visited the OSL at the Rokkasho Safeguards Center staffed by JSGO of MEXT and NMCC personnel. MEXT representatives provided an outline of safeguards activities, including verifications and inspections at RRP. The OSL, which is jointly used by MEXT/NMCC and the IAEA, has been established in the JNFL analytical building as recommended by LASCAR. The OSL is equipped with a variety of sophisticated high precision measurement instruments for nuclear material analytical analysis, thus providing timely analysis of a large number of samples and reducing the need for shipping inspector's verification samples to an off-site location.

Safeguards Activities at TRP

At TRP, JAEA representatives presented to the NRC staff an overview of the safeguards program for TRP, including an IAEA-supported safeguards improvement plan to strengthen the effectiveness and efficiency of international and domestic safeguards programs at the facility. TRP is a large R&D scale reprocessing facility, and applies international and domestic safeguards programs that are comparable to the ones at RRP.

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In addition, TRP safeguards staff provided the NRC team with a double-page summary of the safeguards and material accounting system used at TRP. This summary was not discussed in any detail during the meetings, but provides a useful listing of systems and methods employed at TRP.

PENDING ACTIONS/PLANNED NEXT STEPS FOR NRC

The visit provided NRC staff valuable information regarding the contents and implementation of RRP's MC&A program and JNFL's conduct of safety/risk analysis. The staff intends to document significant regulatory insights from the visit in its annual report to DOE due to be provided to DOE by the end of April 2010.

Within Fiscal Year 10, the staff intends to request a similar visit to LaHague in France to observe implementation of other regulatory areas such as waste management and environmental effluent and monitoring programs.

POINTS FOR COMMISSION CONSIDERATION/ITEMS OF INTEREST

None

ATTACHMENTS

1. Agenda
2. Contact Information and Business Cards
3. Presentations and documents provided to NRC staff during visit

ON THE MARGINS

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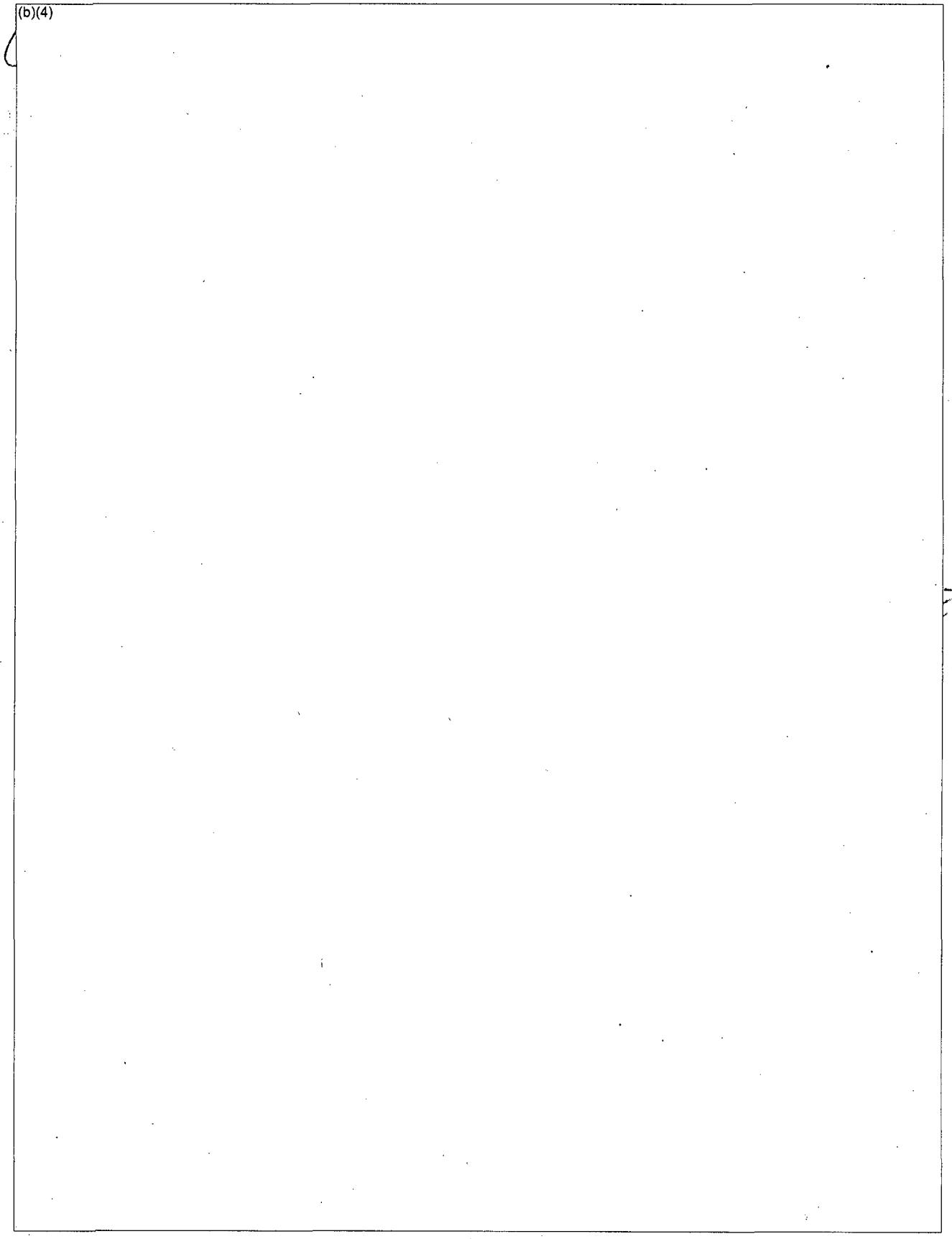

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