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FINAL
DOE/OR/21950-1016

RESPONSIVENESS SUMMARY: PRAXAIR INTERIM ACTIONS ENGINEERING EVALUATION/COST ANALYSIS (EE/CA)

TONAWANDA, NEW YORK

MAY 1996

prepared by
U.S. Department of Energy, Oak Ridge Operations Office, Formerly Utilized Sites Remedial Action Program

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ACRONYMS AND ABBREVIATIONS

ALARA	as low as reasonably achievable
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm	centimeters
DOE	Department of Energy
DOH	State of New York Department of Health
dpm	disintegrations per minute
EE/CA	Engineering Evaluation/Cost Analysis
FUSRAP	Formerly Utilized Sites Remedial Action Program
mR/hr	milliRoentgen per hour
mrem/yr	millirems per year
NEPA	National Environmental Policy Act
NRC	Nuclear Regulatory Commission
NYCRR	New York Codes of Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
pCi/g	picocuries per gram
RCRA	Resource Conservation and Recovery Act
TAGM	Technical Administrative Guidance Memorandum
U	uranium

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1. INTRODUCTION

On January 29, 1996, the Department of Energy (DOE) published an Engineering Evaluation/Cost Analysis (EE/CA) for proposed interim actions at the Praxair property (formerly Linde) in Tonawanda, New York (DOE 1996). The 30-day comment period was extended to 45 days at the request of community members. The comment period closed March 14, 1996. A number of comments were submitted to DOE over the 45-day comment period. This Responsiveness Summary addresses the significant comments received from the public during the comment period.

DOE's preferred alternative for the Praxair Interim Action is Alternative 2 in the EE/CA. This alternative includes demolition of Building 38 and removal of soil and rubble (containing radioactivity greater than the cleanup guidelines) to a licensed radioactive waste disposal facility. Removal of the radioactive materials from the site is protective of human health and the environment and will allow future use of the area now occupied by Building 38 with no radiological restrictions.

2. SCOPE AND ORGANIZATION OF THE RESPONSIVENESS SUMMARY

Eight letters were received during the comment period, many of which expressed similar questions and concerns. To prevent repetition and to organize the responses, the comments were grouped under 8 key subject areas: the preferred remedy; interim actions; National Environmental Policy Act (NEPA) considerations; interim action details; waste disposal; cleanup guidelines; risk evaluation; and editorial.

A few comments were received that were outside the scope of this EE/CA, primarily questions regarding other portions of the Tonawanda site. These comments have not been addressed in this Responsiveness Summary since they were not specific to the removal of the soil storage pile or the demolition of Building 38. Comments regarding other portions of the Tonawanda site will be addressed as part of the ongoing discussions with the community regarding a sitewide remedy. DOE encourages those interested in other aspects of the Tonawanda site to visit the DOE Public Information Center in Tonawanda. DOE maintains the center as a resource for the public. This information center contains the Administrative Record File for the Tonawanda site, which consists of the documentation gathered by DOE in investigating the site. A toll free number (1-800-253-9759) is also available.

3. COMMENTS AND RESPONSES

The format used to address each key subject area consists of a set of composite questions representing the range of comments and the main concerns raised on a given issue. Each composite question is then followed by DOE's response. The complete text of submitted

comments are included in Appendix A of this Responsiveness Summary. Each question or comment in Appendix A has been marked to identify the DOE response that covers that question or comment. This Responsiveness Summary finalizes the *EE/CA for the Praxair Interim Actions* and will be placed in the Administrative Record File. Table 1 provides a list of persons or organizations submitting comments, and Table 2 provides an index showing where the response to each specific comment is addressed.

Table 1. Individuals and Organizations Submitting Comments

Gary H. Bauer
Mark C. DiMaria
Gayla Gross
Norman Nosenchuck, P.E., Director, Division of Solid and Hazardous Materials New York State Department of Environmental Conservation
James M. Rauch F.A.C.T.S.
Karim Rimawi, Ph. D. Director, Bureau of Environmental Radiation Protection State of New York Department of Health
Richard Tobe Chairman, Coalition Against Nuclear material in Tonawanda (CANiT), and Commissioner, Environment and Planning County of Erie, New York
Richard Tobe (2nd Letter) Submittal of comments from MJW, Inc.

Table 2. Comment Response Index

Commentor	Comment #	Page #	Response Category
F.A.C.T.S.	1a	A-1	outside of scope
	2a	A-2	Section 3.3
	3a	A-2	Section 3.6
	4a	A-3	Section 3.6
	5a	A-3	Section 3.7
	6a	A-3	outside of scope
	7a	A-4	Section 3.4
State of New York Department of Health	1b	A-12	Section 3.1
	2b	A-13	Section 3.4
	3b	A-13	Section 3.5
	4b	A-13	Section 3.8
	5b	A-13	Section 3.4
	6b	A-13	Section 3.5
New York State Department of Environmental Conservation, Division of Solid and Hazardous Materials	1c	A-14	Section 3.1
Mark C. DiMaria, Letter	1d	A-15	Sections 3.1 and 3.7
Gayla Gross, Letter	1e	A-16	Section 3.2
	2e	A-16	Section 3.3
	3e	A-16	Section 3.4
	4e	A-16	Section 3.7
County of Erie, Department of Environment and Planning (Richard M. Tobe)	1f	A-17	Section 3.2
	2f	A-17	Section 3.4
	3f	A-18	Section 3.4
	4f	A-18	Section 3.5
	5f	A-18	Section 3.2
	6f	A-18	Section 3.4
	7f	A-18	Section 3.8
	8f	A-18	Section 3.7
	9f	A-19	Section 3.5
	10f	A-19	Section 3.2
	11f	A-19	Section 3.5
	12f	A-19	Section 3.6
	13f	A-19	Section 3.4
Gary H. Bauer, Letter	1g	A-21	Section 3.6
	2g	A-21	Section 3.1
	3g	A-21	comments noted
County of Erie (addendum to original letter - submittal of MJW comments)	1h	A-23	Section 3.1
	2h	A-23	Section 3.4
	3h	A-23	Section 3.6

3.1 THE PREFERRED REMEDY

Several letters, including those from the New York State Department of Environmental Conservation (NYSDEC) and the State of New York Department of Health (DOH), expressed agreement with DOE's preferred alternative (demolition of Building 38 and shipment of soil and building rubble to a licensed disposal facility). NYSDEC requested an understanding that agreement on a final cleanup guideline is reserved until the preferred final remedy for the site is discussed. DOH expressed agreement as long as implementing the preferred alternative does not delay the implementation of a permanent remedy for the site. Others expressed agreement in principle, but had questions or concerns with specific details of the actual work plans. Citing transportation risks and costs associated with DOE's preferred alternative, one reviewer stated that an onsite disposal option warranted evaluation in order to avoid "passing the buck" to another community.

DOE notes support of the preferred alternative, and will continue to work with the state and local government agencies and citizens to develop a final remedy for the entire Tonawanda site. The interim actions as proposed in DOE's preferred alternative will not impact the schedule for selection of a final cleanup remedy for the site, but are in fact designed to support DOE's Assistant Secretary of Energy Thomas Grumbley's commitment to Tonawanda to demonstrate near-term progress while the long-term sitewide alternatives are being addressed.

DOE agrees with the reviewer who felt that onsite disposal should be a reasonable alternative, especially in light of the costs and risks of transportation for offsite disposal. It is in light of DOE's aforementioned commitment to show near-term progress that onsite disposal was not evaluated in the EE/CA. Community opposition to onsite disposal resulted in the suspension of the decision-making process for the Tonawanda site as a whole; for this reason onsite storage was screened out early in the development of the EE/CA.

DOE will continue to inform the public about specific activities taking place at Praxair and the Tonawanda site via such sources as information sessions, newsletters, and the public information center. Specific reservations regarding the details of the work to be conducted at the site are addressed in the following sections of the responsiveness summary.

3.2 INTERIM ACTIONS

Many comments were received relative to the decision-making process for interim actions and where interim actions fit into the final plans for the Tonawanda site. Reviewers wanted to know if other interim actions are planned, and if they are, how will they impact this EE/CA and the final plans for the site? Commentors also wanted to know: How were the Praxair sites selected for the interim action? By what criteria? How and when will other remaining areas described in the FS be remediated?

DOE has proposed the interim actions (outlined in the EE/CA) in order to fulfill Assistant Secretary of Energy Thomas Grumbley's commitment to the community of Tonawanda, New York. In a letter to Congressman LaFalce dated August 5, 1995, Mr. Grumbley committed to perform interim actions to demonstrate near-term progress while long-term sitewide alternatives are being addressed with the community. At this point, the final remedy for the site has not been selected.

DOE's selection of Building 38 and the storage pile for interim action was an attempt to provide the most benefit to the community within the available funding and schedule constraints. Of properties comprising the Tonawanda site, the Praxair facility is the only one which supports a large employee population. Removal of Building 38 and the stored soil will free up necessary space in an active industrial complex, allowing for expansion. Building 38 is not currently occupied, thus potential interferences with ongoing facility operations are minimized.

It is also important that interim actions not prejudice the final outcome for the site. The alternatives considered under this EE/CA do not preclude any conceivable final actions from taking place. The volumes of material to be disposed at an offsite radioactive disposal facility under this EE/CA are small relative to the total volume of material at the site, therefore offsite disposal of this material is not expected to prejudice a decision for the remaining material at the site. Because of its condition, Building 38 has been slated for demolition for some time. Conducting this interim action now will in no way prejudice the final decision for the site.

At this time, other interim actions (such as the demolition of Building 30) have not been planned. If other interim actions are identified, the appropriate environmental documentation to be provided will be determined by the action selected. The selection of future interim actions and the ultimate disposition of the site will depend on the progress DOE and the community make toward reaching a final decision. As with this interim action, any future interim actions would be discussed with the community prior to implementation.

3.3 NEPA CONSIDERATIONS

One reviewer wanted to know how NEPA impacts are evaluated, and suggested that future EE/CAs could benefit by including an explanation of why this and other pending interim actions will not prejudice the final cleanup. Another reviewer expressed disagreement with DOE's use of the EE/CA as a mechanism for environmental impact review for this action, and emphasized that the interim action does not constitute the final remedy.

DOE agrees with the comment that an explanation of why DOE's preferred alternative will not prejudice the final decision for the site should be provided in future EE/CA's. An explanation covering this issue for the *Praxair Interim Actions EE/CA* is provided in Section 3.2 of this Responsiveness Summary.

It is DOE policy to integrate NEPA values into the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process being conducted at Formerly Utilized Sites Remedial Action Program (FUSRAP) sites. Under this policy, DOE will rely on the CERCLA process for review of actions to be taken under CERCLA and will incorporate NEPA values into CERCLA documents; no separate NEPA review process will be documented. The Praxair EE/CA incorporates NEPA considerations for the soil removal and Building 38 demolition.

The level of detail to which these NEPA considerations are evaluated is dependent on the level of NEPA analysis considered appropriate for the action. 10 CFR 1021 provides for implementation of NEPA by DOE. It also lists classes of action that have been determined to not have significant impacts on the environment, either individually or on a cumulative basis. For the decontamination activities being conducted at Praxair Buildings 31, 14, and 30, categorical exclusions were considered appropriate, thus no formal documented environmental analysis is needed. DOE has, however, incorporated all of the required NEPA considerations in the Feasibility Study (DOE 1993a) conducted for the site.

This interim action does not constitute a final remedy for the site. The sitewide CERCLA process must be completed and the sitewide Record of Decision Report issued before any cleanup can be considered final remediation.

3.4 INTERIM ACTION DETAILS

Many reviewers had questions or concerns about specific details of the proposed interim action, including what would be done about any contaminated soil and storm drains that might be under the building. CANiT questioned the discussion of one consolidated pile, when they possess a DOE-provided schedule from an October 16, 1995 meeting with DOE which shows the excavation and disposal of two Praxair piles. Schedules for issuing the detailed Health and Safety Plan and the completion of the interim action were requested, as were details on the cost estimate.

Two reviewers expressed concern that the high radioactivity levels detected in dust samples from the rafters warranted special precautions not discussed in the EE/CA. One was concerned that site restoration activities might mix or spread existing radioactivity in soils in order to dilute the material to levels below cleanup standards. DOH also expressed concern

about mixing wastes of different contamination levels, and suggested that Building 38 should be dismantled and materials segregated according to contamination levels before disposal. Another reviewer suggested that a temporary total enclosure would be warranted.

The EE/CA addresses the demolition of Building 38 (excluding removal of the floor slab), but does not address any soils or other structures such as sewer systems which may be below the floor of the building. These are considered outside the scope of the EE/CA, and will be addressed, as appropriate, through the future remedial actions to be taken at the site. The scope of this interim action is only to demolish one building (Building 38), and remove the contaminated soil next to Building 90. There is only one pile of soil next to Building 90. However, the schedule referenced by CANiT details removal of the soil in two phases.

The detailed Health and Safety Plan associated with this interim action will be issued prior to the start of any field work, which is currently scheduled to begin in late 1996. The Health and Safety Plan will be accompanied by site-specific training of site personnel. The Health and Safety Plan will be available after its issuance in the information repositories for interested parties.

The cost estimate for Alternative 2 was developed using a standard cost estimating methodology developed for FUSRAP which presents costs in defined categories. A summary level detail table for the EE/CA cost estimate is provided in Appendix B. This estimate is intended to provide order of magnitude costs for comparing alternatives. Final estimates will be developed during the final planning of the actions.

Protective measures will be taken to assure that workers and the public are protected from potential exposures during the demolition of Building 38 and the removal of the soil pile. These safety precautions will be detailed in the work controlling documents for the project, including the Health and Safety Plan. The site safety and health program takes steps to preclude or mitigate hazards posed by radiological, chemical, or industrial factors. An air monitoring program has been established both for workers and the general public. Weekly safety meetings will be held to notify manual and non-manual workers at the site of expected and potential hazards, and to review lessons learned and safety and health requirements. A program to limit exposure to levels as low as reasonably achievable (ALARA) is implemented as part of work planning and pre-task training for workers to ensure they have knowledge of the work processes, and as a mechanism to limit exposures to as far below the standards as is practical. FUSRAP has completed many projects with similar conditions and ranges of contamination, and experience has shown that standard engineering and administrative controls for these levels of contamination are very effective.

These same ALARA principles will be used in demolishing the building. For example, the highest levels of contamination found in the building were associated with dust in the roof trusses and purlins. This dust will be removed from the roof members using a high-efficiency vacuum prior to demolition of this building. This will prevent generation of airborne radioactivity when the ceiling is demolished. Details of this work will be addressed in the work controlling documents for building demolition. It is not anticipated at this time that the demolition will require waste segregation by contamination levels or that a total enclosure will be necessary, but ALARA principles dictate that this be re-evaluated as additional information regarding the building is obtained during remedial design and remedial action.

Site restoration activities will be designed to minimize any potential for remaining radioactive material to spread or mix with clean materials. The work areas will be configured to avoid generating additional wastes as a result of the restoration activities. Wastes associated with Building 38 demolition will be separated from the soil pile and disposed offsite at a licensed commercial disposal facility. Soil from the soil pile will be segregated from other wastes. Soils with radioactivity greater than the cleanup guidelines will be disposed offsite at a licensed commercial disposal facility.

3.5 WASTE DISPOSAL

Many questions were received on the details of waste disposal for wastes expected to be generated during the proposed action. Reviewers asked if licensed disposal facilities had been identified for accepting and disposing of the radioactive waste or the clean demolition material, and if any asbestos or other hazardous waste was likely to be generated. Several questions centered on the disposal of demolition wastes identified as radiologically "clean." DOH requested the criteria to be used by DOE to classify waste as clean, and asked about the intended disposal location for materials above background but below the criteria used for classifying wastes as radioactive. DOH also questioned whether DOE intended to dispose all of the material in the soil storage pile as radioactive waste, and, if not, what criteria would be used to determine which portion will be left on site?

Licensed commercial disposal facilities are available for out-of-state disposal of the radioactive waste. Two such facilities currently interested in FUSRAP-generated wastes are Envirocare of Utah and Dawn Mining. Local solid waste landfills are also available for the non-radiological waste from the project. In decontamination or demolition of buildings erected during the 1940's, the potential to generate hazardous or mixed waste is always present. Paints used in such buildings were normally lead-based, and asbestos is common in insulation, floor tile, and fireproofing materials. If present, these materials will be stabilized and disposed at a licensed commercial and disposal facility, either as hazardous,

mixed, or low level radioactive waste [if the RCRA (Resource Conservation and Recovery Act) hazardous constituent can be treated]. No firm decisions have yet been made as to the actual disposal facilities that will be utilized; DOE will develop these arrangements during the detailed design stage of the project.

The stored soil consists of material generated over a period of years from multiple small projects at Praxair/Linde. The placement of material on the pile has not been strictly controlled, so it is likely that some clean materials have been placed in this storage location. Because the stored soil has not been characterized, the EE/CA recognizes the possibility that some materials may be below cleanup guidelines, and therefore unsuitable for management as radioactive waste. FUSRAP is currently evaluating instrumentation and techniques for accurately segregating such material. If a suitable technique is available at the time the storage pile is scheduled for removal, DOE reserves the right to use it as a waste reduction technique.

The cleanup guidelines for residual concentrations of Radium-226 and Thorium-230 are 5 picocuries per gram (pCi/g), averaged over the first 15 centimeters (cm) of soil below the surface, and 15 pCi/g, averaged over 15 cm-thick layers of soil more than 15 cm below the surface (DOE Order 5400.5 and 40 CFR Part 192.12). For uranium (U) (total), the cleanup guideline is 60 pCi/g at all depths. Soil which does not contain radioactivity greater than these cleanup guidelines will remain onsite and be turned back over to Praxair or be used as fill. If building materials meet the uranium surface release criteria (1,000 disintegrations per minute (dpm)/100 cm^2 removable, 5,000 dpm/100 cm^2 total), then the materials could be disposed in a licensed landfill.

3.6 CLEANUP GUIDELINES

Many comments were received regarding apparent discrepancies between the many standards and guidelines applicable to radioactivity. State, federal, and DOE standards appear to conflict, and commentors called for compliance with the most stringent of standards. Most believed the state guidelines to be strictest, and requests were made to compare DOE's site-specific uranium guidelines and 100 millirem/year maximum public exposure guidelines with NYSDEC Technical Administrative Guidance Memorandum (TAGM)-4003, which specifies a dose limit of 10 millirem/year under reasonable exposure scenarios. One commentor questioned whether the cleanup would meet the requirement for release of facilities specified in New York Codes of Rules and Regulations (NYCRR) Part 16, Appendix A, Table 7.

Many of the concerns regarding cleanup standards and guidelines are more relevant to the Tonawanda site as a whole than to the cleanup proposed under this EE/CA. Most of the criteria present limits on radioactivity in terms of dose (i.e., how much exposure an individual is receiving) instead of concentration (i.e., pCi/g). For this reason, some standards are not directly comparable, and

confusion can result when different assumptions are made regarding the dose an individual might receive under varying scenarios.

It is important to restate DOE's intent to comply with all relevant and appropriate standards in the performance of work at the Tonawanda site. DOE considers all state, federal, and local regulations in accordance with the requirements of CERCLA. Generally, these regulations set maximum standards; it is DOE's intent to keep actual and potential exposures as far below the standards as is reasonably achievable; in most cases, actual exposures are kept to a small fraction of the allowable standards.

It is also important to understand that there are differences in how some of the standards and guidelines are applied. DOE has adopted the public exposure limit of 100 millirems per year (mrem/yr) recommended by the International Commission on Radiological Protection, and the National Council on Radiation Protection and Measurements. This guideline applies to exposures from all sources and pathways (excluding exposures from natural background, radon, medical procedures, and consumer products) under the most conservative future uses of the site. NYSDEC's limit applies to the most reasonable future uses of the site. Different assumptions could be made in support of the analysis of these two guidelines.

For DOE's uranium cleanup guideline analysis, a resident farmer was assumed as the worst case scenario. In addition to spending almost all his time living and working on the site, the resident farmer is assumed to drink groundwater from the site, eat vegetables grown in the soil, and eat meat and drink milk from animals grazing on plants grown in the soil. Because the models are designed to be conservative (i.e., tend to overestimate versus underestimate risk), this worst case scenario results in a very conservative assessment of the dose an individual might receive. Under NYSDEC's TAGM, such a projected future use at the site would not be considered likely, and a more reasonable scenario resulting in a lower projected dose, would be selected. As part of the analysis to derive a uranium cleanup guideline, DOE included an industrial worker exposure scenario to model one of the likely future land uses. Under this reasonable use scenario, the uranium cleanup guideline of 60 pCi/g is equivalent to a dose of 3 mrem/yr for an industrial worker.

The beta/gamma surface criteria for release of material or facilities specified in NYCRR part 16, Appendix A, Table 7, include a total dose rate of 0.2 milliRoentgen per hour (mR/hr), and a removable surface contamination limit of 1,000 dpm/100 cm^2. The DOE and Nuclear Regulatory Commission (NRC) surface contamination guidelines (shown in Appendix C) are similar to the NYCRR Table 7 values. For uranium (which will be assessed primarily using beta-gamma measurements), the guidelines include 5,000 dpm/100 cm^2 average,

and 1,000 dpm/100 cm^2 removable surface activity. In addition, an average surface beta-gamma dose rate limit of 0.2 millirad/hr (essentially equivalent to the NYCRR dose limit of 0.2 mR/hr) is specified in DOE Order 5400.5. It is expected that use of the DOE and NRC surface contamination guidelines will result in cleanup of surfaces to levels which will meet the NYCRR Appendix 16-A, Table 7 criteria.

3.7 RISK EVALUATION

Several comments were received relative to the risk evaluation associated with the proposed action. Two commentors requested a more thorough evaluation of transportation risks, including the number of trucks and rail cars, and expected routes; one requested justification as to why a more thorough transportation risk analysis was not done in the EE/CA. One commentor felt that transportation risks and costs justified an onsite alternative. One commentor felt that a public exposure accounting system should be put in place to track and monitor public exposure along the transportation route. A comment was received questioning whether reuse of soil below guidelines would cause further long-term exposures. Another felt that DOE's risk assessments were flawed by considering only fatal cancers, and stated that residual contamination would subject site users to correspondingly elevated rates of non-fatal cancers, inheritable mutations, and birth defects.

A detailed evaluation of transportation risks was not conducted due to the small volume of wastes to be shipped offsite under the preferred alternative. While rail transportation is safer than truck, in both cases the risk of a transportation fatality is less than one, even if the material requires transport as far as the West coast. This is because of the relatively small volume of material requiring transport.

It is also important to note that the risks from transportation of this material are based on transportation accident rates, not the radioactive nature of the material. By its nature, the risk from this material is based on significant long-term exposures. Measurements taken outside the transportation vehicles are generally at near-background rates; therefore, radiation exposure to individuals along a transportation route would not be measurable, making a public exposure accounting system unnecessary.

Based on analyses performed to derive the site-specific uranium cleanup guideline, leaving soils containing less than 60 pCi/g of total uranium will result in potential doses much less than the 100 mrem/yr public dose limit. It is expected that under reasonable future exposure scenarios, the doses associated with residual radioactivity at the site (after completion of all cleanup activities) will be less than the New York State guideline of 10 mrem/yr. In fact, analyses used to support the uranium cleanup guideline derivation show that projected

doses for an industrial worker and recreational scenario were 3 mrem/yr and less than 2 mrem/yr, respectively.

DOE's risk assessments are performed in accordance with EPA risk assessment guidance. Site-related risks are presented in terms of incremental cancer morbidity (incidence of fatal and non-fatal cancer), not cancer mortality (cancer deaths). Birth defects and mutations have been primarily associated with radiation exposures at very high dose rates, and with very high total doses. These effects are not known to be associated with exposure to low levels of radioactivity such as those found in materials at the Tonawanda site. Current EPA radiation risk guidance specifies that while these effects may be possible, the risk of cancer from radiation exposure is the limiting concern, and cancer induction should be the sole basis for assessment of the risks associated with exposure to radiation at remediation sites.

3.8 EDITORIAL

Two editorial comments were received. Page 6 of the EE/CA refers the reader to Figure 3 during a discussion of the original storage areas under Site History, but the former storage areas are not shown on the figure. Under the discussion of guidelines for allowable average, maximum, and removable radioactivity levels for uranium for unrestricted use, DOH notes that the document fails to mention what type of radiation it is referring to, and suggests that it would be useful to include a copy of the table from the referenced Regulatory Guide 1.86.

The reference to Figure 3 in the site history discussion is out of place. The locations of the former storage areas and tailings area (and many other details about other aspects of the Tonawanda site) can be found in Figure 1-5 of the Tonawanda Remedial Investigation Report (DOE 1993b). These locations are not within the scope of this EE/CA, but will be included as part of the sitewide remediation.

The surface radioactivity guidelines discussed in Section 2.3 of the EE/CA are specific to uranium [U-natural, U-235, U-238, and associated decay product, alpha emitters (see EE/CA page 8, Section 2.3, second paragraph, last sentence)]. Compliance with the uranium surface activity guidelines is demonstrated using field measurements of alpha and beta surface contamination levels. Copies of the surface activity guidelines from DOE Order 5400.5, and Regulatory Guide 1.86 are included in Appendix C.

4.0 REFERENCES

DOE 1993a. *Feasibility Study for the Tonawanda Site, Tonawanda, New York*, CCN 110104, DOE/OR/21950-234, Oak Ridge, TN, SAIC-FUSRAP, November.

DOE 1993b. *Remedial Investigation Report for the Tonawanda Site, Tonawanda, New York*, DOE/OR/21949-300, Oak Ridge, TN, BNI-FUSRAP, February.

DOE 1996. *Engineering Evaluation/Cost Analysis (EE/CA) for Praxair Interim Actions, Tonawanda, New York*, CCN 138190, Oak Ridge, TN, SAIC-FUSRAP, January.

Wagoner 1992. DOE Washington, D.C. Memorandum from J.W. Wagoner II (Uranium guidelines for the Tonawanda Sites) to L.K. Price, DOE Oak Ridge, TN, CCN087978, April 8.

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APPENDIX A

COMMENTS RECEIVED ON THE PRAXAIR INTERIM ACTIONS EE/CA

140500

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"PUTTING THE PIECES TOGETHER"

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COMMENTS ON "ENGINEERING EVALUATION/COST ANALYSIS (EE/CA) FOR PRAXAIR INTERIM ACTIONS, JANUARY 1996"

James M. Rauch March 12, 1996

a) Since last October the Department of Energy (DOE) has been conducting an "interim" action at the Linde/Praxair property of the Tonawanda Site. This "interim" action consists of an expensive, labor-intensive, partial decontamination of Buildings 31, 14, and 30, in spite of the community's overwhelming preference for EIS Alternative 2 which calls for the less costly demolition and offsite disposal of all four buildings (three of which were built by the Manhattan Project at taxpayer expense) including an estimated 5,000 cubic yards of contaminated soil under the buildings. DOE claims this action qualifies for a NEPA Categorical Exclusion from public environmental review. We disagree and have objected to this costly building decontamination action for two reasons:

1) DOE has maintained that "too-high" cost is the primary obstacle to implementing EIS Alternative 2. Yet, DOE claims that this more costly "interim" decontamination action will not prejudice the selection of a sitewide "final remediation" plan. These two statements are clearly incompatible. On October 23, 1995 at Congressman LaFalce's Niagara Falls office, DOE Assistant Secretary Thomas Grumbly made a commitment to us to disclose the extra cost of building decontamination over the cost of demolition. He has failed to do so. Are we to conclude that lack of money will not be a factor in the selection of a sitewide "final remediation" plan?

2) The buildings are being cleaned to meet the DOE's basic radiation dose guideline of 100 millirems per year above background assuming the current limited-use exposure scenario--industrial use. This dose level corresponds to a 33% increase in fatal cancers. We do not believe this is sufficiently protective of workers' health. It also does not seem to meet the surface decontamination requirements for release of facilities specified in the NYS Department of Health regulation NYCRR Part 16, Appendix A, Table 7.

1a Comments on Buildings 31, 14, and 30 decontamination outside the scope of this EE/CA.

b) Now the DOE has issued (on January 29, 1996) a draft "Engineering Evaluation/Cost Analysis (EE/CA) for Praxair Interim Actions" covering only: 1) the demolition of Building 38, and 2) removal of the radioactive debris and soils that exceed DOE's cleanup criteria from the onsite soil pile. At the request of FACTS and CANiT, the comment period has been extended to March 15, 1996, a 45 day period as previously prescribed. While the "suspended" EIS documents (Remedial Investigation [RI], Baseline Risk Assessment [BRA], Feasibility Study [FS] and Proposed Plan [PP]) are mentioned, DOE apparently believes the twenty page EE/CA itself to be a sufficient environmental impact review for this "interim" removal action. We disagree and we object to this proposal for the following reasons:

1) On page 9, DOE claims "It is reasonable to expect any site-wide remedy to include controls [restrictions on access to the site, deed limitations on residential use, etc.] to prevent exposures resulting from future activities at the site." We do not know where DOE got this idea; certainly not at any public meetings. Both the community and the private property owners expect a thorough cleanup that will remove radioactive contaminants down to a level which will allow unrestricted, safe use of the Site in the future. This is the stated goal of DOE's Formerly Utilized Remedial Action Program (FUSRAP). And with good reason, since these radioactive wastes have a hazardous life of over 500,000 years. Also, the US Nuclear Regulatory Commission (NRC), in an open public rulemaking (10CFR61), has decided that institutional control measures to reduce public exposure at radioactive waste disposal sites can only be relied upon for a period of up to 100 years.

2a Response Summary Section

In addition, the statement seems to imply that the proposed "interim" action will constitute "final remediation" for this portion of the Site. If so, the proposal clearly violates the prescribed, and still "suspended", sitewide full EIS/ROD process. Admiral Guimond's commitment (for DOE) that any final cleanup plan must have the community's full acceptance and NEPA/CERCLA law both clearly require that the sitewide EIS process must be completed and the sitewide Record of Decision be must issued before any cleanup work at any part of the site can be considered "final remediation".

2) The DOE's basic dose guideline (following cleanup) of 100 millirems per year above background is too high to adequately protect future generations either working (limited use exposure scenario) or living (unrestricted use exposure scenario) at the Site; it would allow a 33% to over 200% increase, respectively, in radiation-induced fatal cancers for the next 500,000 years. EPA is currently proposing (at 40CFR196) a dose limit of 15 millirems per year above background after cleanup. The New York State Department of Environmental Conservation's (NYSDEC) guideline, TAGM-4003, calls for cleanup to 10 millirems per year above background, which corresponds to an increase of 3.3% in fatal cancers.

3a Respons Summary Sectio

The cleanup criteria for soils which DOE has selected for Tonawanda will not allow unrestricted use of the Site following cleanup. After cleanup to the DOE's site-specific uranium criterion for Tonawanda's soils, DOE uranium remaining at the Site would produce 40 millirems per year of radiation dose above background, according to DOE's own model for unrestricted use--the resident farmer scenario (page 8 of EE/CA). The criteria for radium and thorium are taken from the US EPA's Uranium Mill Tailings Radiation Control Act guidelines (40CFR192) which were developed for remote western uranium mill tailings sites. Cleanup to these criteria will impose an additional 600 millirems per year of dose above background, which corresponds to a 200% increase in radiation-induced fatal cancer, on unrestricted future users of the Site (see pp 24-26 of GAO report, attached). Thus, an unrestricted future user of the Site could be exposed to more than a 200% increased risk of premature fatal cancer.

4a Response Summary Section 3.6

DOE's cleanup criteria are sufficient to meet DOE's basic dose guideline (100 millirems per year above background) following cleanup only under a very restrictive industrial use exposure scenario. Both Praxair workers and the community expect any cleanup, whether "interim" actions or "final remediation", to clean the Site more thoroughly, i.e. to meet the State dose guideline of 10 millirems per year above background, using an unrestricted use exposure scenario. As indicated above, cleanup to a level that will allow unrestricted use is the stated goal of DOE's FUSRAP.

Also, DOE's assessment of risk considers only fatal cancer. Residual contamination will also subject Site users to correspondingly elevated rates of non-fatal cancers, inheritable mutations, and birth defects--radiation health effects which DOE has ignored in their risk assessment, but which nonetheless will also impose additional high costs on the community.

3) On page 11 of the EE/CA, it is stated that "Clean material [some of the debris from demolition of Building 38 or some of the soil from the pile] will be disposed at solid waste landfills or recycled." As used here, "clean" includes contaminated materials at or just below the DOE's outdated cleanup criteria described above. These criteria are inappropriate for densely populated, heavily used areas. This means that DOE is planning to dispose of radioactive materials, with concentrations that deliver many times the State dose guideline, in local solid waste landfills which are not suitable for long-term storage of these long-lived wastes. This is totally unacceptable to us.

5a Response Summary Section 3.7

6

In 1981, Building 37 was demolished by Linde (Union Carbide). "Debris from Building 37, having radioactivity exceeding twice the background level, was placed with the tailings [contaminated soil pile]." (page 6 of EE/CA) At that time, "clean" debris was probably material which surveyed at less than 20 uR/hr or about 160 millirems per year; this means some of it was up to 100 millirems

6a (continued)

per year above background. While not stated here, this material was deposited in an [unkown] area of the Town of Tonawanda Landfill, according to page 1-18 of the Remedial Investigation. Thus, according to the current State guideline some of this material is radioactive waste and does not belong in that landfill.

6a Comment outsi scope of EE/C

4) According to page 3-53 of the Baseline Risk Assessment (BRA), surface soil under Building 38 is contaminated above DOE cleanup criteria. The removal of this contaminated soil is not included in the proposed action. However, site restoration activities are included under number (7) on page 18 of the EE/CA. This means that contaminated soils under Building 38 which should be removed, even by DOE's inadequate criteria, may be mixed and re-graded with clean fill during site restoration activities, such that the concentrations of radioactive contaminants is reduced below DOE criteria. This would be an illegal activity and we are firmly opposed to such a result.

DOE has a record in this regard. At the Niagara Falls Storage Site at Lewiston, NY, the concentrated radioactivity in the original R-10 residue pile was diluted by similar mismanagement. DOE subsequently re-classified the R-10 residues as "wastes" (contaminated soils) and now DOE wants to keep these residues--now higher-volume, lower-concentration "wastes"--at Lewiston. Under this formula, DOE mismanagement equals more radiation dose for Lewiston (see pp 5-8 of 8-24-94 ROLE letter to DOE Secretary O'Leary, attached).

7a Response Summary Section 3.4

5) The EE/CA states on pages 7-8 that a sample of dust from a ceiling beam contained 42,000 pCi/g U-238 and 26 pCi/g Ra-226, while "fixed" contamination ranged to 13,409 pCi/100 square centimeters for alpha particle radiation, and 172,881 pCi/100 square centimeters for beta-gamma radiation. This is heavy contamination. Yet the EE/CA gives only a sketchy description, on pages 13, 15 and 17, of how dispersal of heavily contaminated particles will be prevented during demolition: "Once uncovered, the stored soil would be susceptible to wind and water erosion. Dust from demolition and crushing activities could also be released to the air. ... but these effects will be minimized or eliminated by the use of dust suppression measures and barriers to erosion during rain events. ...Plastic sheeting will be used during the construction activities ... As necessary, the stored soil and rubble will be misted with water to reduce the potential for spread of radioactive materials by the wind."

We do not believe the EE/CA gives an adequate description of the proposed action or the risks posed by it. The demolition area will apparently not be totally enclosed in plastic. Since the material may be stored onsite for some time before removal to a licensed disposal facility, a Birdair style temporary total enclosure is desirable to assure containment both during demolition and subsequent temporary storage.

Appendix II

Federal Radiation Exposure Limits

Standard or guideline/ agency	Type/effective date	Limit	Estimated lifetime risk of premature cancer death[a]
General standards/guidelines			
1. General public/NRC	Regulation (10 C.F.R 20), 1993	0.1 rem/yr.	1 in 300
2. General public/EPA	Guidance, 1960	0.5 rem/yr.	1 in 60
3. General public/EPA (draft)	Proposed guidance	0.1 rem/yr.	1 in 300
4. General public/DOE (draft)	Proposed regulation (10 C.F.R. 834)	0.1 rem/yr.	1 in 300
Source-specific standards/guidelines			
5. Uranium mill tailings/ NRC	Regulation (10 C.F.R. 40), 1985		
		Radium 226: 5 pCi/g	1 in 50[b]
		Radon: 20 pCi/m^{2}s	1 in 14,000[c]
6. Reactor effluent design/NRC	Regulation (10 C.F.R. 50, App. I), 1975		
		Liquid: 0.003 rem/yr. total body	1 in 10,000
		Gaseous: 0.005 rem/yr. total body	1 in 6,000
7. High-level waste repository operations/ NRC	Regulation (10 C.F.R. 60), 1983	0.1 rem/yr.	1 in 300
8. Low-level waste/NRC	Regulation (10 C.F.R. 61), 1983	0.025 rem/yr.	1 in 1,000
9. Air pollution/EPA	Regulation (40 C.F.R. 61), 1989, 1991	0.01 rem/yr.	1 in 3,000
10. Drinking water (interim)/ EPA	Regulation (40 C.F.R. 141), 1977	Beta/photon[d]: 0.004 rem/yr.	1 in 7,000
10a. Drinking water (draft)/EPA	Proposed regulation (40 C.F.R. 141)		
		Radium: 20 pCi/l	1 in 14,000
		Radon: 300 pCi/l	1 in 5,000
		Beta/photon[d]: 0.004 rem/yr.	1 in 7,000
11. Uranium fuel cycle/EPA	Regulation (40 C.F.R. 190), 1979-83	0.025 rem/yr.	1 in 1,000
12. Spent fuel, high-level, transuranic waste disposal/ EPA	Regulation (40 C.F.R. 191), 1994		
		All pathway: 0.015 rem/yr.	1 in 2,000
		Ground water: 0.004 rem/yr.[d]	1 in 7,000
		Containment: 1,000 deaths in 10,000 yrs.	1 in 36,000[e]
13. Uranium mill tailings/ EPA	Regulation (40 C.F.R. 192), 1983		
		Radium 226: 5 pCi/g	1 in 50[b]
		Radon: 20 pCi/m^{2}s	1 in 14,000[c]

(continued)

Standard or guideline/ agency	Type/effective date	Limit	Estimated lifetime risk of premature cancer death[a]
14. Ocean dumping/EPA	Regulation (40 C.F.R. 220), 1977	Alpha emitters: 1.35×10^{-3} Ci/kg, 10^{8} kg/yr. rate	Not available
15. Superfund cleanup/EPA	Regulation (40 C.F.R. 300)	10^{-4} to 10^{-6} risk range goals[f]	1 in 15,000 to 1 in 1,500,000
16. Mining effluents/ EPA	Regulation (40 C.F.R. 440), 1983		
		Radium 226 (dissolved): 10 pCi/l/day	Not available
		Uranium: 0.004 g/l/day	Not available
17. Indoor radon/EPA	Guidance	4 pCi/l action level	1 in 40
18. Low-level waste/EPA (draft)	Proposed regulation (40 C.F.R. 193)	All pathway: 0.025 rem/yr.	1 in 1,000
19. Decommissioning/NRC (draft)	Proposed regulation	0.015 rem/yr.	1 in 2,000
20. Cleanup/EPA(draft)	Proposed regulation(40CFR196)	0.015 rem/yr.	1 in 2,000
Occupational standards/guidelines			
21. Occupational/NRC	Regulation (10 C.F.R. 20)	5 rem/yr.	1 in 8[g]
22. Occupational/EPA	Guidance, 1987	5 rem/yr.	1 in 8[g]
23. Radon in uranium mines/EPA	Guidance, 1971	4 WLM/yr.[h]	1 in 16
24. Occupational/DOE	Regulation (10 C.F.R. 835), 1993	5 rem/yr.	1 in 8[g]
25. Under-ground mines/MSHA	Regulation (30 C.F.R. 57), 1977	Radon: 4 WLM/yr.	1 in 16
26. Occupational/OSHA	Regulation (29 C.F.R. 1910.96), 1971	5 rem/yr.	1 in 8[g]

(Table notes on next page)

State

Cleanup/NYS DEC	Guidance(TAGM-4003), 1993	0.010 rem/yr	1 in 3000

[a]For purposes of comparison, the estimated risks in the table are derived from commonly used assumptions (e.g., a cancer death risk of $5x10^{-4}$ per rem to an individual continuously exposed over a 70-year lifetime; for workers, 50-year exposure). The estimated risks may differ from those derived by agencies, which used various assumptions in setting standards and guidelines. Some estimated risks are to individuals, and others are to larger defined populations. Risks are rounded.

[b]Based on exposure to an individual residing on site after cleanup. The estimated risk to an individual off-site could be considerably less.

[c]Based on average population exposure. According to EPA and DOE, the estimated risk to a maximally exposed individual could be considerably greater.

[d]Beta particle and photon radioactivity from man-made radionuclides in community water systems.

[e]Based on an NRC assumption of a population of 250,000.

[f]10^{-4} to 10^{-6} = 1 in 10,000 to 1 in 1,000,000 risk of cancer incidence. The goals in the risk column have been converted to express cancer mortality risk. The dose limit is determined on a site-specific basis, depending upon exposure pathways, radionuclide, total inventory, and site characteristics.

[g]Based on a 50-year working lifetime.

[h]WLM = working level month, equivalent to about 100 picocuries per liter of radon in equilibrium with its progeny for 170 hours of worker exposure.

Source: Derived by GAO in part from CIRRPC, NRC, EPA, and DOE data. A principal source is "A Compendium of Major U.S. Radiation Protection Standards and Guides: Legal and Technical Facts," prepared for CIRRPC by W. A. Mills, D. S. Flack, F. J. Arsenault, and E. F. Conti (Oak Ridge Associated Universities, ORAU 88/F-111, July 1988).

natives for long-term management of the K-65 residues," and further that "having already studied and performed the majority of the interim remedial actions at the site, DOE is now focusing on long-term management of the NFSS wastes and residues because this is the issue that is 'ripe' for a decision at this time." (NYDH-2, page K-51, FEIS) Such statements are simply prevarications.

These are the facts: DOE had prepared a document "Comparative Analysis of Various Interim Handling Alternatives of K-65 Residues at the Niagara Falls Storage Site, July 1983" thirteen months before the draft EIS was released in August 1984. Although this document contained DOE's preferred alternative for managing the K-65 residues (placement in Building 411 within the diked containment, to be joined by the other residues and wastes in the clay-capped tumulus being constructed during the 1982-1986 interim remediation) it was not made a part of the EIS process and subject to public review. Instead, the draft EIS was delayed at least 13 months until after the interim work was well underway, and the final EIS was delayed an additional 20 months, until April 1986, by which time the tumulus was largely completed. So, in the words of NYS Department of Health, quite clearly:

> DOE chose to transfer and stabilize the K-65 residues at NFSS on the basis of an internal evaluation report rather than including those operations in the DEIS. The configuration of the K-65 residues once the interim storage operation is complete severely affects the future considerations of disposal alternatives. [NYDH-8, page K-56, FEIS]

In his 11-2-84 comments on the DEIS, NYSDOH's John Matuszek asked the rhetorical question "was it [the preparation of the July 1983 document separately from the DEIS] a subterfuge to avoid full NEPA review for the actions now in progress at NFSS?" (NYDH-2, page K-50, FEIS) There certainly would have been time had DOE so chosen in 1981, to conduct a legitimate public review before the interim remediation commenced. All DOE actions up to the present time demonstrate that DOE had a preferred alternative prior to commencement of interim actions and acted to implement that alternative while conducting a sham NEPA review process. In subsequent correspondence with DOE, NYSDOH complained that "DOE fails to note that the State has objected each time to DOE's plans for the interim remedial action, and that DOE has chosen to ignore the state's protests to interim remedial storage" (NYDH-8, page K-57, FEIS), and although New York clearly had (and has) a strong scientific and legal case against DOE, unfortunately the Cuomo administration thus far has failed to take action to protect the interests of New Yorkers (see NEPA case citations 5, 6, 7 and 8).

How Residues Became 'Wastes': The R-10 Example

The primary focus of New York State has been DOE's avoidance of public review in managing the K-65 residues. But what about the review process in relation to management of the other residues: L-50, L-30, F-32, R-10? In his comments of 9-19-84, J.

Rauch identified past neglect and mismanagement of the R-10 residues at the site during the 1960s and a 1972 'remedial action' (RAUCH-3, page K-72, FEIS). These residues, which contain over 5 curies of radium-226, had been dumped on the ground in what came to be known as the 'R-10 pile'. As a result of this past mismanagement which had significantly increased the R-10 residue-contaminated volume, the DEIS determined it to be "not practicable" to separate the R-10 residues from other wastes (in the north diked area), and DOE removed them from the more hazardous residue category and placed them in the 'waste' category for purposes of the EIS residue and/or 'waste' removal alternatives. J. Rauch contended that these earlier DOE actions were illustrative of an intentional dilution/declassification approach to managing these residues. His comment was simply dismissed with a terse "opinion is noted." (RAUCH-3, page K-73, FEIS)

In supporting Alternative 4c (complete removal of all residues from NFSS, long-term management of 'wastes' at NFSS), Congressman John LaFalce also commented on the R-10 situation (LAFAL-2, page K-26, FEIS). He noted that the R-10 residues were located in a particular stratum of the 'R-10 pile', and that owing to their higher radium concentration, they should be removed along with the other residues. DOE responded:

> At this point in time, it is difficult to physically define the R-10 residues. Assuming that the volume is somewhere between 7,000 m^3 (the original volume) and 45,000 m^3 (the 1980 R-10 pile volume), removal of the R-10 residues could cost an additional $2.9 to ... $37 million .... Shipment of the R-10 residues would increase transportation-related risks of injury and death by a factor of 2 to 5 over shipment of the other residues alone (shipment of 18,000-56,000 m^3 vs 11,000 m^3). These costs are probably underestimates because additional survey work would have to be done to locate and define the R-10 residues. Erosion and previous activities on and around the pile were such that it is probable that a distinct layer of R-10 residues could not be located. Excavation and control costs would also be higher if the R-10 residues were segregated from the rest of the wastes. [emphasis added] [LAFAL-2, page K-27, FEIS]

What is DOE really saying here? First, DOE acknowledges that past mismanagement has increased the volume of contamination of these residues by up to 7 times. Then DOE points to this increased volume (citing first, the additional costs of excavation, transportation, and environmental isolation of this much-increased contaminated volume at a site suitable for long-term storage, and second, the increased risk of transportation-related injury resulting from transporting this much larger volume of residues) as the reason to keep these residues at NFSS, a very poor physical site for long-term storage!

It is also worth noting DOE's response to Congressman LaFalce's alternative suggestion of deep well burial of the R-10 residues at NFSS: "This option poses an additional problem in that deeply buried R-10 residues would be below the water table."

(LAFAL-2, page K-27, FEIS) By the time that response was made public in the April 1986 FEIS, DOE had already placed the K-65 residues in the basement of Building 411 (the deepest part of the tumulus), the lower portion of such residues being below the water table (see NEPA case citations 1 and 2).

DOE's 'Containment' at NFSS: Premeditated Environmental Dispersal

Concerning the NFSS's physical unsuitability for long-term storage, the experience of only a few decades clearly shows the difficulty of managing these residues at such a wet site and the virtual impossibility of preventing their water-borne environmental dispersal. The seasonal water table fluctuates within a few feet of the surface; the area experiences intense, excursive precipitation events (not adequately accounted for by the Uniform Soil Loss Equation employed in site integrity calculations); the site lies within a 200-year flood plain of Lake Ontario, making it subject to inundation hundreds of times during the hazardous life of the residues (the hydraulic pressures generated during such flood events could squeeze out the tumulus contents like jelly from a doughnut).

DOE's response to a NYSDEC comment that clay is the material that will contain the residues is generally informative:

> It is not stated that clay will contain the wastes. There is a layer of clay in the existing interim cap (Alternative 1, no action), and additional clay will be added if Alternative 2 is implemented. This layer is expected to substantially reduce (but not eliminate) water infiltration down into the buried wastes and residues (Section 4.2.2) and radon gas emissions (Section 4.1.2). The existing clayey soils beneath the containment area are expected to retard (but not eliminate) migration of radionuclides and other chemicals from the wastes and residues (Sections 4.2.2 and 4.3). [NYDEC-15, page K-45, FEIS]

What this means is the clay will only slow the rate of radioactive contamination of still more soils (and water). The increase in contaminated volume is a gradual, ongoing process - it does not occur all at once when the facility is deemed to have failed, whether 50 or 200 or more years from now. [The data presented in Table 3.4 of the DEIS (and duplicated in the FEIS) provides a clear illustration of this point. For the purpose of analyzing the EIS's 'waste' removal alternatives, an estimate is given of the volume of the 'interim' clay containment which will have become sufficiently contaminated to require removal as 'waste' during the time interval before removal is accomplished. This estimated volume of contaminated containment structure is 29,000 cubic yards - more than double the 1985 residue volume. According to the table's footnote 6, this estimate is based on the assumption that "any decision to remove such materials would be within the next few years such that radionuclides from contaminated materials stored within the diked areas would not have sufficient time to migrate through the clay dikes more than 0.6 m (2 ft)." (emphasis added) (Again, these interim actions, although pro-

jected to result in an additional 29,000 cubic yards of 'waste' in a few short years, were, nevertheless, excluded from review in the EIS process. It is now 8 years later. What volume of the 'containment' would now be required to be removed under the 'waste' removal alternatives?)]

Therefore, DOE's plan to keep the residues at NFSS is contrary to the fundamental principle of efficient management of such long-lived materials, i.e. keep the original volume intact (do not let it increase). It also means that if the residues are not removed now, their gradual dispersal into a larger volume of contaminated soil (and water) will further increase the cost and difficulty of their in situ management or removal at a future date. As discussed, DOE has already used the increase in contaminated volume of the R-10 material to argue against its removal.

The existing native clayey soils that make up the 'floor' of the tumulus consist of brown and grey clays. Based on limited site characterization, the grey clay is thought to be more homogeneous (uniform) and to be a better barrier than the brown clay. Sand lenses and other discontinuities are known to exist in the brown clay. Should hydraulic connections through such discontinuities exist or develop, which is likely based on site observations during interim actions, more rapid environmental dispersal of residues than expected will occur. Such was the experience in an unforeseen incident at the West Valley nuclear site in which a plutonium-bearing kerosene solvent leaked from corroded steel tanks and rapidly migrated in 'fingers' through discontinuities in the weathered glacial till, escaping detection by the monitoring well system. At NFSS, the existing, and in all likelihood any expanded, monitoring system is also unlikely to detect such non-plume migration. In this connection it is worth noting that "Clay suitable for the 1-m (3-ft) clay layer in the interim cap (Alternative 1, no action) did not exist at NFSS and had to be obtained from offsite borrow areas." (NYDEC-7, page K-41, FEIS)

Site Maintenance Costs: A Measure of Site Physical Unsuitability

An additional measure of the the physical unsuitability of the NFSS site is readily apparent from DOE's recent estimate of annual maintenance costs for the site: one-half million dollars. (This estimate, given in DOE's 5-25-94 presentation to NAS, is $415,000 more than the $85,000 estimate given in both the DEIS and the FEIS.) This figure includes repairs to the clay cap, maintaining a grass cover on the cap (includes removing trees and other deep-rooted plants), and environmental monitoring. It does not include the truly enormous costs which will be incurred at some not-so-distant time in the future when the progressively leaking facility has contaminated a much greater volume of the environment. From data presented in Table F.1 for Alternative 4a, it is obvious that in less than 60 years, a negligible period of time in relation to the duration of the residues' hazardous life, a sum of money will have been spent for NFSS site maintenance sufficient to have paid for the timely relocation of the residues to a suitable long-term storage environment, such as the Nevada Test Site. At such a site, long-term maintenance costs are expected to be orders of magnitude less and involve princi-

DOH STATE OF NEW YORK
DEPARTMENT OF HEALTH

Office of Public Health II University Place Albany, New York 12203-3399

Barbara A. DeBuono, M.D., M.P.H.
Commissioner

Karen Schimke
Executive Deputy Commissioner

140500

March 22, 1996

Mr. Ron Kirk
New York Sites Manager, FUSRAP
U.S. Department of Energy
Former Sites Restoration Division
Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, TN 37831-8723

Re: Engineering Evaluation/Cost Analysis (EE/CA) for Praxair Interim Actions

Dear Mr. Kirk:

The New York State Department of Health's Bureau of Environmental Radiation has completed the review of the Engineering Evaluation/Cost Analysis (EE/CA) for Praxair Interim Actions document. We agree with the Department of Energy's conclusion that Alternative #2 (Demolition of Building 38, shipment of stored soil and building rubble to a licensed disposal facility) is more protective of human health and the environment than Alternative #1 (No interim action). We find this interim measure to be appropriate as long as it does not become a cause for delay in implementing the permanent remediation of the site.

1b Response Summary Section 3

Attached please find specific comments on the document. Thank you for the opportunity to comment on this document. Please feel free to contact me or Dr. Salame-Alfie if you have any questions. You can contact us at (518) 458-6461.

Sincerely,

Karim Rimawi

Karim Rimawi, Ph.D.
Director
Bureau of Environmental
Radiation Protection

cc: Ron Tramontano, P.E.
Adela Salame-Alfie, Ph.D.

Comment #	SECTION	Page #	Comment	
1	1.3	2	The document specifies that "this removal action is an interim measure which applies only to the stored soil and Building 38 and is not intended to be a remedy for the entire Tonawanda site". The document does not address the condition of soil underneath Building 38. Will this be considered as part of the interim measure?	2b Response Summary Section 3.4
2	1.4	2	At which stage in the interim measure will Buildings 14, 30 and 31 be decontaminated? Was the soil underneath these buildings characterized? If not, are there any plans to do so?	
3	2.1	7	It is stated in the document that soil stored next to Building 90 is made up of a mixture of soil with concentrations ranging from 2 - 100 times background. It is not clear if all of this soil will be shipped to the low-level waste disposal facility. If it is not, what criteria will be used to determine which portion will be left on site.	3b Response Summary Section 3.5
4	2.3	8	In the discussion of guidelines for allowable average, maximum and removable radioactivity levels for uranium for unrestricted use the document fails to mention what type of radiation it is referring to. Since it references Regulatory Guide 1.86 it will be useful to include a copy of the referenced table.	4b Response Summary Section 3.8
5	3.1	11	The description of the demolition activities implies that there will be no dismantlement of structures according to contamination levels. It also seems to imply that materials of varying degrees of contamination will be mixed prior to determining their final disposal location. Our position is that materials should be segregated for disposal on the basis of existing contamination levels prior to mixing them with other wastes.	5b Response Summary Section 3.4
6	3.1	11	Under the Alternative 2 discussion the document indicates that clean material will be disposed at solid waste landfills or recycled. What criteria will be used to classify waste as "clean" and thus acceptable at a solid waste landfill?	6b Response Summary Section 3.5
7	3.1	12	A portion of the waste generated during these actions will not be shipped to either a low-level radioactive waste disposal facility or a sanitary landfill (i.e., material containing < 60 pCi/g of Uranium but greater than background). What will be the final disposition of these wastes?	

140500

New York State Department of Environmental Conservation
Division of Solid & Hazardous Materials
50 Wolf Road, Albany, New York 12233-7250
Phone: 518-457-6934 Fax: 518-457-0629

Michael D. Zagata
Commissioner

FEB 27 [illegible] '96

FEB 23 1996

Mr. Ronald E. Kirk
Site Manager
Former Sites Restoration Division
U.S. Department of Energy
P.O. Box 2001
Oak Ridge, TN 37831-8732

Dear Mr. Kirk:

This responds to your January 25, 1996 letter inviting comments on the "Engineering Evaluation/Cost Analysis (EE/CA) for Praxair Interim Actions." This EE/CA evaluated two alternatives for interim cleanup actions at the former Linde site in Tonawanda, New York (Erie County).

We believe that the United States Department of Energy's (DOE) preferred alternative (Alternative 2, demolition of building, shipment of building rubble and stored soil to licensed disposal facility) **is acceptable, with the understanding that the Department is reserving agreement on the final cleanup guideline until we discuss with DOE the final cleanup remedy.**

1c Response Summary Section 3

Thank you for the opportunity to comment on this document. If you have any questions, please call Paul J. Merges, Ph.D., of my staff, at (518) 457-2225.

Sincerely,

Norman H. Nosenchuck, P.E.
Director
Division of Solid & Hazardous Materials

140500

657 Woodstock Avenue
Tonawanda, NY 14150

FEB 27 8 02 AM '96

February 12, 1996

Ronald E. Kirk, Site Manager
Former Sites Restoration Division
U.S. Department of Energy
P.O. Box 2001
Oak Ridge, TN 37831-8732

Dear Mr. Kirk:

I am a resident of the Town of Tonawanda and am concerned about the DOE's options as presented within the engineering evaluation/cost analysis. The first option, conduct no interim action, is obviously not prudent. The evaluation sites Building 38's continued deterioration as a concern threatening the spread of radioactive dust as possible. Option two, dismantlement of the building and removal along with the stored soil, seems to be lacking in identifying all potential environmental safety effects. This option seems to be "passing the buck" to another community along with risking others in transit. Other options need to be considered. One such suggestion would be to store the soil and building on site using the same containment technology utilized at a licensed disposal facility. This would certainly be more cost effective since the report sites transportation as being the costliest portion of the estimated $11.3 million cost. The Praxair site would seem ideal for this to be feasable since it is a secured industrial site with little public exposure.

1d Response Summary Sections 3.1 and 3.7

Sincerely,

Mark C. DiMaria

140500

Gayla Gross
3580 Sowles Rd. #213
Hamburg, NY 14075

Mar 12 4 09 PM '96

February 28, 1996

Mr. Ron Kirk
New York Sites Manager, FUSRAP
U.S. DOE
Former Sites Restoration Division
Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, TN 37831-8723

Dear Mr. Kirk:

Here are my comments on the Praxair Interim Actions EE/CA.

Section 1.2, Page 2. Are these the only interim actions planned for the Praxair site? Future EE/CA reports could benefit by including a "Big Picture" list of all the site units slated for interim actions and an explanation of why the net result of these interim actions will not preclude selection of a preferred alternative for the entire site.

1e Response Summary Section 3.2

Section 1.3, Page 2. It is not clear whether NEPA evaluation of stored soil removal and Building 38 demolition activities occurred under a categorical exclusion. How were the impacts evaluated for stored soil removal and Building 38 demolition?

2e Response Summary Section 3.3

Section 3.1, Page 11. The description of Building 38 demolition does not address the possibility of contaminated industrial wastewater and storm sewers. Are these structures present in Building 38? Will they be excavated when the building is demolished or are the site wastewater and storm sewer systems (including associated contaminated soil and groundwater) considered separate hazardous waste management units?

3e Response Summary Section 3.4

Section 3.2.1, Page 13. Although best management practices will reduce the potential for exposure to workers and nearby residents during remediation, transporation risks should be more thoroughly discussed. How many truck shipments constitute 12,550 cubic yards? How many rail cars? What are the transportation routes? Given the waste characterization and waste volume, the number of shipments, and the routes, justify why a transportation accident and impact analysis for workers and the public was not performed. On the other hand, if other remediation wastes are transported off site in the future, it seems prudent to begin a "public exposure accounting system" now with this interim action.

4e Response Summary Section 3.7

I hope my comments help improve this action and perhaps future actions at the Praxair site.

Sincerely,

Gayla Gross

Gayla Gross

140500

County of Erie

DENNIS T. GORSKI
COUNTY EXECUTIVE

DEPARTMENT OF ENVIRONMENT AND PLANNING

RICHARD M. TOBE
COMMISSIONER

March 12, 1996

Ronald E. Kirk, Site Manager
Former Sites Restoration Division
U.S. Department of Energy
P.O. Box 2001
Oak Ridge, Tennessee 37831-8732

Re: Engineering Evaluation/Cost Analysis (EE/CA) for Praxair Interim Actions

Dear Mr. Kirk:

On behalf of the Coalition Against Nuclear materials in Tonawanda (CANiT), please find the following questions and comments related to the above referenced document, for your review.

- What are the purpose and objectives of the proposed interim actions?
- How were the interim actions for remediating buildings 14,30, 31 and 38 and the stockpiled soils derived?
- How and when will other remaining contaminated areas, described in the Feasibility Study for the Tonawanda Site be remediated?
- How were the contaminated sites at Praxair selected for inclusion in the scope of work for the interim action? What were the criteria used in the selection process?

1f Response Summary Section 3.2

- What is the current schedule for completing the interim remediation work at Praxair?

2f Response Summary Section 3.4

ERIE COUNTY OFFICE BUILDING, 95 FRANKLIN STREET, BUFFALO, NEW YORK 14202 (716) 858-6716

- The work schedule for Praxair interim actions, provided to CANiT on October 16, 1995, shows the excavation and transportation of two piles (October, April FY97). The EE/CA states, only one pile, the consolidated soil pile west of Building 90 exists. Please resolve this discrepancy.

3f Response Summary Section 3.4

- Has a licensed disposal facility been identified for accepting and disposing of the radioactive waste?

4f Response Summary Section 3.5

- Are other interim measures being planned at additional portions of the Praxair site; at other Tonawanda FUSRAP properties?

5f Response Summ Section 3.2

- When will the detailed Health and Safety Plan cited on page 17 of the EE/CA be available for review, describing the protective measures to be followed should Alternative 2 be the preferred alternative?

6f Response Summ Section 3.4

- Figure 3 does not show the location for the original storage areas along the northern and eastern fences and in a tailings area as stated in Section 1.5, Paragraph 4, Page 6. Where are these locations and have the areas been cleaned up to current action guidelines during the consolidation process?

7f Response Sumr Section 3.8

- Due to low exposure projections, it is proposed that soil with radioactivity of under 60 pCi/g of total uranium or 5 pCi/g for radium or thorium will remain on-site. As the soil may remain on-site, using this material as "clean fill" as proposed in Section 3.1, Alternative 2, Paragraph 2, Page 12 may pose problems. By grading the site with the "clean fill" material, the fill could potentially cause further long term exposure from residual contamination. Has the volume of material been estimated? How will the material be used on-site? In order to limit exposure and to avoid unnecessary redistribution of the "clean fill" material at a later date, what site provisions will be in place?

8f Response Sum Section 3.7

- Does the DOE anticipate the generation of hazardous or mixed waste, specifically asbestos wastes, as a result of the demolition of Building 38? — 9f Response Summary Section 3.5

- How will the potential demolition of Building 30 impact the information contained in the EE/CA document? If Building 30 is demolished, how will the EE/CA be amended, or will and independent EE/CA be issued for the demolition of Building 30? How will this impact the project schedule for the interim actions? — 10f Response Summary Section 3.2

- Section 3.1 Alternative 2 states that for Building 38, demolition material which is clean will be disposed at a solid waste landfill or recycled. Can a New York State Department of Environmental Conservation licensed solid waste landfill accept this material? Has a receiving site been identified? — 11f Response Summary Section 3.5

- In Section 2.3, Page 8, the EE/CA states that guidelines have been developed which specify the levels of residual radioactive material that are acceptable for use of property without restrictions. The EE/CA further states that for uranium contamination, a site-specific guideline is normally developed for each individual site. The EE/CA then states that for Tonawanda, the site-specific guidelines for residual radioactive material are consistent with the USEPA regulations (40 CFR 192). How do the DOE's Tonawanda site-specific guidelines compare with the NYSDEC Technical Administrative Guidance Memorandum - 4003 (TAGM)? Please advise. — 12f Response Summary Section 3.6

- Table 1, Page 15 states the costs for Alternative 2 is $11.3 million. What is the basis of this cost estimate? Please provide a breakout of costs, by task, and unit prices used in the development of this cost estimate. — 13f Response Summary Section 3.4

We respectfully request that DOE insure that CANiT be added to a distribution list to receive any documents, reports and investigations developed by DOE or its subcontractors applicable to the five Tonawanda FUSRAP properties.

Should you have any questions or require additional information, please contact me at (716) 858-6716.

Very truly yours,

RICHARD M. TOBE
Chairman, Coalition Against Nuclear material in Tonawanda

and

Commissioner, Environment and Planning

RMT:MLS:ems

cc: CANiT Members

140500

Gary H. Bauer
22 Newell Apt. 6
Tonawanda, N.Y.
14150
(716) 694-0393.

Monday, March 13, 1996.

MAR 25 7 12 AM '96

Dear Ron Kirk,

In order to protect the health and safety of all Tonawanda residents, both now and into the future, the radiological toxic waste clean-ups at all five Tonawanda sites, should be conducted using the more stringent N.Y. State guidelines. 1g Response Summary Section 3.6

Each site clean-up, should be complete and done once, versus partial, and left for future generations to worry about. Wastes should be removed and shipped out-of-town to a safe storage site until science research can render these wastes harmless to the environment. This includes removing the contaminated buildings and all the contaminated ground under them, located at the Linde/Praxaire site. 2g Response Summary Section 3.1

Radiological toxic waste clean-ups are not a matter of how much money the clean-ups cost, but rather, deciding what our priorities are, to spend the money we have.

As a concerned citizen, I can think of no greater or higher priority for spending tax dollars, than to eliminate the risk to human health caused by radiological toxic wastes. 3g Comments noted

Sincerely,

Gary H. Bauer

Note:
This letter represents my comments in reply to the Engineering Evaluation and Cost Analysis prepared by the DOE for the Town of Tonawanda.

140500

Mar 25 7 12 AM '96

County of Erie

DENNIS T. GORSKI
COUNTY EXECUTIVE

DEPARTMENT OF ENVIRONMENT AND PLANNING

RICHARD M. TOBE
COMMISSIONER

MICHAEL RAAB
DEPUTY COMMISSIONER
ENVIRONMENTAL COMPLIANCE SERVICES

March 14, 1996

Ronald E. Kirk, Site Manager
Former Sites Restoration Division
U.S. Department of Energy
P.O. Box 2001
Oak Ridge, Tennessee 37831-8732

Re: Engineering Evaluation/Cost Analysis (EE/CA) for Praxair Interim Actions

Dear Mr. Kirk:

Attached please find a letter from MJW Corporation outlining additional concerns with respect to the Engineering Evaluation/Cost Analysis (EE/CA) for Praxair Interim Actions.

The issues raised in the attached letter parallel the concerns of CANiT and should be considered as an addendum to the March 12, 1996 transmittal from Richard M. Tobe to your office.

Should you have any questions, please call me at (716) 858-7897.

Very truly yours,

PAUL B. KRANZ, P.E.
Associate Engineer

PBK:ems

cc: Richard M. Tobe, Commissioner - ECDEP, Chairman - CANiT
CANiT Members

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ERIE COUNTY OFFICE BUILDING, 95 FRANKLIN STREET, BUFFALO, NEW YORK 14202-3973, PHONE: 716/858-8370

MJW *Radiological and Health Physics Consulting Services*

March 14, 1996

Mr. Paul Kranz, Associate Engineer
Erie County Department of Environment and Planning
95 Franklin Street
Buffalo, New York 14202

Dear Mr. Kranz:

Dr. David Dooley and I have jointly reviewed the Engineering Evaluation/Cost Analysis (EE/CA) for Praxair Interim Actions dated January, 1996. We both concur with the DOE in their identification of Alternate #2 as the preferred course of action as described in the EE/CA. However, we are concerned due to statements in Section 2.2, Survey Results. It is presented that most floor and wall surfaces in the building have levels of fixed radioactivity exceeding guidelines with no removable radioactivity detected in those areas. This section then goes on to identify that the analysis of dust samples, taken from the ceiling beams in Building 38, revealed activity levels of 42,000 pCi/g of U-238, 26 pCi/g of Ra-226 and 31 pCi/g of Th-230. This represents a considerable quantity of removable radioactivity which is not clearly identified, nor considered in this EE/CA.

1h Response Summa: Section 3.1

The report fails to fully evaluate the significance of the removable radiological contamination in Building 38. The analysis of results presented in Section 2.4 states "radioactivity in the building is currently contained, further deterioration of the building could potentially result in migration of radioactivity from the building materials". This statement implies the only risk to the public and environment would result from the slow process of building material deterioration, liberating radioactivity that is currently fixed. This of course is a minor concern when contrasted with the significant removable radioactivity present as dust on the ceiling beams. The loss of containment of this radioactive material could occur over a much shorter and more immediate time span than recognized in the EE/CA. Any of several possible scenarios could result in the resuspension and airborne release of the contaminated dust.

2h Response Summa: Section 3.4

The presence of significant removable contamination in Building 38 does not appear to be adequately considered throughout the remainder of the EE/CA. Although the existence of this removable radioactivity actually strengthens the decision that Alternative # 2 is the necessary course of action, this source must be clearly addressed in the detailed work plans generated for the demolition of Building 38.

An additional concern arises upon review of the cleanup guidelines presented in Section 2.3 of the EE/CA. The guidelines presented are those contained in DOE Order 5400.5. The applicability of these guidelines must be evaluated both in terms of the New York State requirements and more importantly in context with potential future uses of this area of Tonawanda.

3h Response Summa: Section 3.6

338 Harris Hill Road, Suite 208, Williamsville, New York 14221
Phone (716) 631-8291 Fax (716) 631-5631

Thank-you for the opportunity to review and provide comment on this BE/CA. If you have any questions concerning these issues please contact me at (716) 372-2866.

Sincerely,
MJW Corporation Inc.

James P. Griffin, CHP
Senior Health Physicist

JPG:lc

338 Harris Hill Road, Suite 208, Williamsville, New York 14221
Phone (716) 631-8291 Fax (716) 631-5631

APPENDIX B

COST ESTIMATE SUMMARY

Tonawanda Project
FUSRAP Remediation Alternatives
Summary Table

30 Year Cost in , 1995$

Activity	LINDE EE/CA Alternative 2
Excavation & Backfill	**$338,092**
Treatment	**0**
Transportation & Disposal	**4,562,097**
-Transportation	1,593,801
-Disposal	2,968,296
Construction & Sampling	**1,093,052**
-Monitoring, Sampling & Analysis	293,362
-Site Development	36,639
-Building & Services	71,461
-Other Collection & Control	0
-Demolition & Decontamination	691,591
Other	**700,678**
-Site Management	0
-Site Engineering & Tech. Support	0
-Site Environmental Compliance	0
-Site Inst. Controls, Surv. & Maint.	8,129
-Other Remedial Action	692,548
Total Sitework	**6,693,918**
-Screening & Assessment	0
-Remedial Design	213,182
-Disposal Siting	0
-Project Management	0
-Engineering & Technical Support	0
-Other	966,198
Total Project Support	**1,179,380**
Subtotal Project	**7,873,299**
Contingency (25%)	**1,968,325**
Total Project	**9,841,624**
Program Support (15%)	**1,476,244**
Total Costs	**$11,317,867**

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APPENDIX C

SURFACE CONTAMINATION GUIDELINES FROM DOE ORDER 5400.5 AND NRC REGULATORY GUIDE 1.86

Figure IV-1
Surface Contamination Guidelines

Radionuclides[2/]	Allowable Total Residual Surface Contamination (dpm/100 cm²)[1/] Average[3/,4/]	Maximum[4/,5/]	Removable[4/,6/]
Transuranics, I-125, I-129, Ra-226, Ac-227, Ra-228, Th-228, Th-230, Pa-231.	RESERVED	RESERVED	RESERVED
Th-Natural, Sr-90, I-126, I-131, I-133, Ra-223, Ra-224, U-232, Th-232.	1,000	3,000	200
U-Natural, U-235, U-238, and associated decay product, alpha emitters.	5,000	15,000	1,000
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.[2/]	5,000	15,000	1,000

1/ As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

2/ Where surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides should apply independently.

3/ Measurements of average contamination should not be averaged over an area of more than 1 m². For objects of less surface area, the average should be derived for each such object.

4/ The average and maximum dose rates associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/h and 1.0 mrad/h, respectively, at 1 cm.

5/ The maximum contamination level applies to an area of not more than 100 cm².

TABLE I

ACCEPTABLE SURFACE CONTAMINATION LEVELS

NUCLIDE[a]	AVERAGE[b c]	MAXIMUM[b d]	REMOVABLE[b e]
U-nat, U-235, U-238, and associated decay products	5,000 dpm α/100 cm^2	15,000 dpm α/100 cm^2	1,000 dpm α/100 cm^2
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm^2	300 dpm/100 cm^2	20 dpm/100 cm^2
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1000 dpm/100 cm^2	3000 dpm/100 cm^2	200 dpm/100 cm^2
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5000 dpm β-γ/100 cm^2	15,000 dpm β-γ/100 cm^2	1000 dpm β-γ/100 cm^2

[a] Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

[b] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[c] Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

[d] The maximum contamination level applies to an area of not more than 100 cm^2.

[e] The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.