MODIFICATION NO. M040

CONTRACTOR AND ADDRESS:	Brookhaven Science Associates, LLC Brookhaven National Laboratory Upton, NY 11973
MODIFICATION FOR:	Recognition of previous obligation increases; Modification of Article 4, Statement of Work; Addition of Article 46A, Travel Restrictions; Modification of Article 64, Lobbying Restriction (Energy and Water Development Appropriations Act, 2000; Modification of Article 65, Lobbying Restriction (Department of Interior and Related Agencies Appropriations Act, 2000); Modification of Article 122A, Purchase of American-Made Equipment and Products-Sense of Congress; Addition of Article 122B, Prohibition of Contracts with Persons Falsely labeling Products as Made in America; Replacement of Appendix B - Performance Measures and Criteria; Replacement of Appendix E - Make-or Buy Plan; Replacement of Appendix H - Small Business Subcontracting Plan; Replacement of Appendix I - DOE Directives; Replace of Appendix L and, Addition of Appendix N - Chronic Beryllium Disease Prevention Program (CBDPP).

PRIOR OBLIGATION:	$780,714,075.26
INCREASE IN MODS. A035 THROUGH A039	$341,524,102.57
INCREASE IN THIS MODIFICATION	-0-
CURRENT TOTAL OBLIGATION:	$1,122,238,177.83

THIS MODIFICATION, effective the 17th day of April 2000, by and between the UNITED STATES OF AMERICA (hereinafter referred to as the "Government"), as represented by the UNITED STATES DEPARTMENT OF ENERGY (hereinafter referred to as "DOE"), and BROOKHAVEN SCIENCE ASSOCIATES, LLC (hereinafter referred to as the "Contractor"),

WITNESSETH THAT:

WHEREAS, the Government and the Contractor entered into Contract No. DE-AC02-98CH10886) on the 5th day of January 1998, for the operation of the Brookhaven National Laboratory; and

WHEREAS, said contract has been modified previously, and the parties desire to modify said contract further, as hereinafter provided; and

WHEREAS, this modification is authorized by law, including 41 U.S.C. 252(c)(15), P.L. 95-91 and other applicable law;

NOW, THEREFORE, said contract, as modified previously, is hereby further modified as follows:

1. The first sentence of paragraph (a) of Article 31, OBLIGATION OF FUNDS, is revised to read as follows: "The amount presently obligated by the Government with respect to this contract is $1,122,238,177.83."

2. **ARTICLE 4** - STATEMENT OF WORK (SPECIAL) - is modified as follows: In subparagraph (c), Administration and Operation of the Laboratory, item (2), Protection of the Worker, the Public and the Environment, add the following paragraph between paragraph 5 and 6: "The contractor must ensure that a Chronic Beryllium Disease Prevention Program (CBDPP) is prepared for the facility that meet the general CBDPP requirements specified in Appendix N."

3. The following article is added:

"**ARTICLE 46A** - TRAVEL RESTRICTIONS (AL 99-07)

(a) For contractor travel expenses incurred on or after October 1, 1999 a ceiling limitation of $3,980,000.00 shall apply to all reimbursements made for contractor travel expenses under this contract. Expended funds which exceed the established ceiling will be unallowable unless otherwise authorized by the contracting officer (Applicable only to FY 2000 Energy and Water Development Appropriation Act Funds).

(b) Notwithstanding any other provisions of the contract, the contractor further agrees that none of the funds obligated under the contract may be used to reimburse employee travel costs incurred on or after October 1, 1999 and before October 1, 2000 which exceed the rates and amounts that apply to federal employees under subchapter I of Chapter 57 of Title 5, United States Code. To the extent that this contract provides elsewhere for the reimbursement of employee travel costs which exceed the rates and amounts that apply to federal employees under subchapter 1 of Chapter 57 of Title 5, United States Code, the preceding limitation on reimbursement of employee travel costs applies to costs incurred on or after December 1, 1999 and before October 1, 2000. Costs which exceed these rates and amounts will be unallowable. This restriction is in addition to those prescribed elsewhere in statute or regulation.

(c) Costs incurred for lodging, meals, and incidental expenses are considered reasonable and allowable to the extent that they do not exceed the maximum per diem rates in effect at the time of travel as set forth in:

(i) Federal Travel Regulations (FTR) for travel within the 48 states;

(ii) Joint Travel Regulations (JTR) for travel in Alaska, Hawaii, the Commonwealth of Puerto Rico, and territories and possessions of the United States; or

(iii) Standardized Regulations (SR) for travel allowances in foreign areas.

(d) Subparagraph (c) does not incorporate the regulations cited above in their entirety. Only the coverages in the referenced regulations addressing the maximum per diem rates, the definitions of lodging, meals, and incidental expenses, and special or unusual situations are applicable to contractor travel.

(e) Airfare costs in excess of the lowest customary standard, coach, or equivalent airfare offered during normal business hours are unallowable except when such accommodations require circuitous routing, require travel during unreasonable hours, excessively prolong travel, result in increased cost that would offset transportation savings,

are not reasonably adequate for the physical or medical needs of the traveler, or are not reasonably available to meet mission requirements. However, in order for airfare costs in excess of the above standard airfare to be allowable, the applicable condition(s) set forth above must be documented and justified. (End of Clause)"

4. **ARTICLE 64** - LOBBYING RESTRICTION (ENERGY AND WATER DEVELOPMENT APPROPRIATIONS ACT, 1999) is deleted in its entirety and replaced with the following:

"**ARTICLE 64** - LOBBYING RESTRICTION (ENERGY AND WATER DEVELOPMENT APPROPRIATIONS ACT, 2000)
The contractor agrees that none of the funds obligated on this award shall be expended, directly or indirectly, to influence congressional action on any legislation or appropriation matters pending before Congress, other than to communicate the Members of Congress as described in 18 U.S.C. 1913. This restriction is in addition to those prescribed elsewhere in stature and regulation. (End of Clause)"

5. **ARTICLE 65** - LOBBYING RESTRICTION (DEPARTMENT OF INTERIOR AND RELATED AGENCIES APPROPRIATIONS ACT, 1999) is deleted in its entirety and replaced with the following:

"**ARTICLE 65** - LOBBYING RESTRICTION (DEPARTMENT OF INTERIOR AND RELATED AGENCIES APPROPRIATIONS ACT, 2000)

The contractor agrees that none of the funds obligated on this award shall be made available for any activity or the publication or distribution of literature that in any way tends to promote public support or opposition to any legislative proposal on which Congressional action is not complete. This restriction is in addition to those prescribed elsewhere in stature and regulation. (End of Clause)"

6. **ARTICLE 122A** - NOTICE REGARDING THE PURCHASE OF AMERICAN-MADE EQUIPMENT AND PRODUCTS -SENSE OF CONGRESS Is deleted in its entirety and replaced with the following:

"**ARTICLE 122A** - NOTICE REGARDING THE PURCHASE OF AMERICAN-MADE EQUIPMENT AND PRODUCTS -SENSE OF CONGRESS (AL-99-07)
It is the sense of the Congress that, to the greatest extent practicable, all equipment and products purchased with fund made available under this award shall be American-made. (End of Notice)"

7. The following article is added:

"**ARTICLE 122B** - PROHIBITION OF CONTRACTS WITH PERSONS FALSELY LABELING PRODUCTS AS MADE IN AMERICA
Pursuant to FAR 9.405(a), Awards shall not be made to entities that are included on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs.
If DOE, or DOE contractor personnel become aware of a possible violation of the prohibition against falsely mislabeling products as made in America, and the entity is not on the List of Parties excluded from Federal Procurement and Nonprocurement

Programs, the matter should be promptly reported through the DOE Contracting Officer to the Office of Management Systems, Office of Procurement and Assistance Management, for potential debarment of the entity pursuant to Far 9.406-2(a)(4) and 9.406-2(b)(1)(iii)."

8. **APPENDIX B** - Performance Measures and Criteria identified as Modification M024 and M034 are deleted in their entirety and replaced by Appendix B - Performance Measures and Criteria identified as Modification M040.

9. **APPENDIX E** - Make-or Buy Plan is deleted in its entirety and replaced by Appendix E - Make or Buy Plan, identified as Modification M040.

10. **APPENDIX H**, - Small Business, Small Disadvantaged Business, Women-Owned Small Business, and Hub Zone small Business Subcontracting Plan is deleted in its entirety and replaced by Appendix H, Small Business, Small Disadvantaged Business, Women-Owned Small Business, and Hub Zone small Business Subcontracting Plan, identified as Modification M040

11. **APPENDIX I** - DOE Directive identified as Modification M034 is deleted in its entirety and replaced by Appendix I - DOE Directive identified as Modification M040.

12. **APPENDIX L** - Computation of Fee, identified as Modification M028 is deleted in its entirety and replaced by Appendix L - FY 2000 Computation of Fee and Fee Determination Matrix identified as Modification M040.

13. **APPENDIX N** - Chronic Beryllium Disease Prevention Program (CBDPP) Identified as Modification M040 is added.

IN WITNESS WHEREOF, the parties have executed this document.

UNITED STATES OF AMERICA
DEPARTMENT OF ENERGY

BY: _____

Robert P. Gordon
Contracting Officer
(Title)

DATE: 4-17-00

BROOKHAVEN SCIENCE ASSOCIATES, LLC

BY: _____

Brian P. Sack
Chief Financial Officer
(Title)

DATE: 4/14/00

APPENDIX B

CRITICAL OUTCOMES, OBJECTIVES AND PERFORMANCE MEASURES

FY 2000

BROOKHAVEN NATIONAL LABORATORY

April 2000

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Performance Evaluation System

Introduction

This Contract Appendix sets forth the performance evaluation system (including processes, criteria, schedules, and measures) that will be used to evaluate the overall performance of Brookhaven Science Associates (BSA) in the management and operation of Brookhaven National Laboratory (BNL) in Fiscal Year 2000 (FY00).

For the period of FY00, in accordance with Article 6 of the Contract, the Parties have agreed to use a Performance-Based Management System (PBMS) which includes clear and reasonable objectives, against which BSA's overall performance will be evaluated. For this purpose, the parties have agreed to an objective hierarchy consisting of Critical Outcomes, underlying Objectives, and associated Performance Measures with predetermined weights and metrics for the assessment of BSA's performance and the resulting determination of fee. This "Critical Outcome Process" is designed to measure overall performance and drive the improvement agenda of the Laboratory by linking Laboratory rewards, i.e., performance ratings and associated fees, to a prioritized set of objectives that have been mutually developed by DOE and BSA. DOE and BSA have mutually agreed to the specific Critical Outcomes, Objectives, and Performance Measures contained herein and, as described in Articles 6 and 7, agree to a reassessment of the process, prior to the beginning of each evaluation period.

In addition to the above noted Performance Measures, there are other DOE expectations related to BNL performance. In general, these are also derived by the Critical Outcome process, but are deemed of lesser importance in regard to determining the overall performance of the Laboratory. Attachment 3, entitled "Other Contract Expectations" contains a list of these performance expectations, categorized by the Critical Outcome to which they are related, and a discussion about how these will be used by DOE in evaluating the Laboratory's performance is contained in the section of this Introduction entitled "DOE Evaluation." The Laboratory's Annual Self-Evaluation will include a discussion of BNL performance relative to these items.

In a July 13, 1998 memorandum, the Director of the DOE Office of Science (SC) identified high-level expectations in six critical areas that SC would use to guide its regular assessment of Laboratory performance. These critical areas are Science, Leadership, Environment Safety & Health (ES&H), Infrastructure, Business Operations, and Stakeholder Relations. In this memorandum it was noted that SC expects SC/HQ program managers, field offices, and laboratories to work in partnership to develop laboratory-specific outcomes, objectives, and measures which support these high-level expectations and to use self-assessment as a tool to ensure desired outcomes and achieve continuous improvement.

Critical Outcomes, Objectives, and Performance Measures

The Critical Outcomes identified below were developed using this guidance and the site-specific needs for improvement at BNL. DOE-BHG, CH and HQ, in partnership with BSA, have mutually agreed that the specific Critical Outcomes listed below are appropriate for BNL. These Critical Outcomes are those end state results having the highest level of strategic impact and value to DOE.

The Laboratory's Critical Outcomes for Fiscal Year 2000 are:

1. **Basic Science and Technology** - BNL will deliver innovative, forefront science and technology aligned with DOE strategic goals in a safe, environmentally sound, and efficient manner, and will conceive, design, construct, and operate world-class user facilities.
2. **Communications and Trust** - BNL will be recognized as a community asset, a good neighbor, and a valued employer.

3. **Environment, Safety, and Health Excellence** - BNL will conduct all work and operate all facilities with distinction, fully integrated with and supportive of its science, technology and cleanup missions, while being fully protective of its workers, users, the public, and the environment.
4. **Leadership and Management** - BNL will be recognized by its Users, staff, stakeholders, and customers as having the highest quality leaders and staff; as being an exemplary environmental steward; and supporting its missions with the best business practices, computing services, infrastructure, and information management systems.

Flowing from these four Critical Outcomes are 24 underlying Objectives that constitute the necessary and sufficient accomplishments for achieving the Critical Outcomes they support. They are sustainable targets over a 1-3 year timeframe and form a complete, non-redundant set of results for evaluating progress toward achievement of the Critical Outcomes.

Performance Measures are a clear, unambiguous set of conditions that, by definition and mutual agreement, determine completely the extent to which an Objective is achieved. As with the Critical Outcomes and Objectives, Performance Measures form a complete, non-redundant set of achievements to ensure adequate coverage and balanced priorities for a given Objective. Performance Measures are specific to the performance period, i.e., the fiscal year, and require the development of metrics to facilitate adjectival ratings. For FY00, 34 Performance Measures were developed using the guidelines discussed on page 9 of this document.

The Critical Outcomes, Objectives and Performance Measures agreed to for FY00 through the DOE/BSA Critical Outcome process are contained in Attachment 1 to this Appendix.

To determine the Laboratory's overall performance, Critical Outcomes, Objectives and Performance Measures are weighted to reflect the priority DOE attaches to the accomplishment of each. Performance against each of the Measures is then assessed and rolled up into a rating not only for each Objective and Critical Outcome area, but also for the overall performance of Laboratory.

In FY00, the relative weights of the Critical Outcomes reflect a high priority on the success of the Laboratory's science and technology mission and the need for continued improved performance in the areas of ES&H, Communications and Trust, and Environmental Stewardship.

At the Objective level, a similar situation exists. In particular, the FY00 priorities continue to reflect an emphasis on infrastructure development; i.e., management systems, work control programs, and other such systems; than on operational results. This is because the noted infrastructure developments are precursors to achieving the desired improvements in operational performance. Following the completion of this development and implementation phase in FY00, the Objective priorities will undergo a systematic shift to focus on operational results.

It is important to emphasize that the Critical Outcome process must be flexible to accommodate changes as planned improvements are realized and/or customer priorities vary. For example, even though the Critical Outcomes and Objectives are designed as sustainable targets over a 3-5 year and 1-3 year time frame respectively, their relative weights are expected to change more frequently. Reprioritization of the Critical Outcomes, Objectives, and Performance Measures is a fundamental part of the annual Critical Outcome process.

In addition, there may be a need to change some Performance Measures (or metrics), and perhaps the relative weights of the corresponding Objectives, within the fiscal year as DOE priorities shift and/or new information is acquired. This will be accomplished under formal change control within the Laboratory and subject to approval by the DOE Contracting Officer.

Annual Self-Evaluation and Improvement Agenda

Collectively, the Critical Outcomes, Objectives and Performance Measures constitute a major portion of the BNL Integrated Information Management System. As such, they form the basis for the Laboratory's annual Self-Evaluation process and are key elements in the Integrated Assessment and Process Improvement Programs. These are the keys to closing the feedback loop of the Laboratory's Performance-Based Management System.

On an annual basis, the Laboratory will conduct a formal Self-Evaluation of its performance relative to each Critical Outcome, Objective, and Performance Measure identified in Attachment 1 to this Appendix. This will be part of the broader Integrated Assessment Program and will become a major part of an Annual Self-Evaluation Report to DOE. This Report will also address other significant issues or opportunities that arise from the Laboratory's broader Integrated Assessment Program whether or not they impact the Critical Outcomes.

Process improvement at BNL involves two levels, Laboratory-wide and the Directorate/Department/Division level. The Laboratory's Integrated Assessment Program is the primary mechanism to identify and prioritize improvement initiatives. At the Laboratory level, these would be factored into the Critical Outcomes, Objectives, and/or Performance Measures for the next performance period. The Program will also identify and prioritize improvement actions at Directorate/Department/Division levels. This is the level at which organizational specific requirements, e.g., Balance Score Card and Property and Procurement, may be addressed.

Schedule

In order to meet customer and stakeholder expectations, as well as clearly define the path forward, the following schedule is presented.

DATE	ELEMENT
10/31/99	Contractor submits FY99 Annual Self-Evaluation report to DOE
11/15/99	DOE submits draft Evaluation report to Contractor
11/30/99	Contractor submits comments on draft report
12/15/99	DOE transmits final FY99 Evaluation report to Contractor.
01/00	BNL/DOE Management retreat to assess customer strategic needs and revise Critical Outcomes and Objectives, as necessary.
02/01/00	Begin development process for FY01 Critical Outcomes, Objectives, and Performance Measures.
04/15/00	Contractor submits mid-year status report.
04/30/00	DOE performs mid-year status review.
04/30/00	FY01 Critical Outcomes, Objectives and Performance Measures prioritized and approved by BNL and DOE-BHG.
05/15/00	Final FY01 Critical Outcomes, Objectives, and Performance Measures submitted to DOE-Chicago.
06/15/00	Final FY01 Critical Outcomes, Objectives and Performance Measures to DOE-HQ.
09/30/00	FY00 evaluation period ends.
09/30/00	Incorporate FY01 Critical Outcomes into Contract.
10/15/00	Contractor submits FY00 Annual Self-Evaluation report to DOE.
11/01/00	DOE transmits draft Evaluation Report to Contractor.

11/15/00	Contractor submits comments on draft report.
11/30/00	DOE transmits final FY00 Evaluation report to contractor.

Scoring

Each of the Performance Measures has an associated metric accompanied by a scale that translates the level of performance to an adjectival rating. Unless otherwise specified for a given measure, the scoring methodology for the assessment process is based upon the following adjectival ratings:

- Outstanding - Significantly exceeds the standards of performance, achieves noteworthy results, accomplishes very difficult tasks in a timely manner.
- Excellent - Exceeds expectations and standards of performance, accomplishes difficult tasks in a timely manner, and minor deficiencies are more than offset by better performance in other areas.
- Good - Meets expectations and standards of performance, actions are carried out in an efficient and timely manner, deficiencies do not affect overall performance.
- Marginal - Below the standards of performance, deficiencies cause serious delays and re-scheduling, schedules are adversely affected.
- Unsatisfactory - Well below standards of performance, deficiencies cause serious delays and re-scheduling, corrective action requires high-level management attention.

Scoring of the individual Performance Measures is based on the following point scheme:

Outstanding	4
Excellent	3
Good	2
Marginal	1
Unsatisfactory	0

For example, in any given Performance Measure, if the adjectival rating is "Excellent," a score of 3 is given to the measure. An Objective score can then be computed by multiplying the weight of each Performance Measure in that Objective by its score. These are added together to develop an overall score for each Objective which is then translated into an adjectival rating. The process is continued for the Critical Outcomes by multiplying the scores for each Objective within a given Critical Outcome by its corresponding weight, adding the resulting numbers to get a Critical Outcome score, and converting this score to an adjectival rating as done for the Objective level. The same process is then used to calculate an overall score, and then the adjectival rating, at the Laboratory level.

The following list provides that scoring range for the Objective, Critical Outcome, and Laboratory levels.

OUTSTANDING	>3.5 to 4.0
EXCELLENT	>2.5 to 3.5
GOOD	>1.5 to 2.5
MARGINAL	>0.5 to 1.5
UNSATISFACTORY	$\leq$ 0 to 0.5

Weighting

DOE and the Contractor have agreed that the individual Critical Outcomes, Objectives and Performance Measures will be the primary (but not the sole) criteria for determining the Contractor's final performance ratings and fee for the performance period.

For the primary criteria, the following list provides the weights of each Critical Outcome, Objective, and Performance Measure for FY00. These weights were developed in a partnership between DOE and the Contractor and were designed to achieve an appropriate balance between mission priorities and improvement needs. Relative importance of a Critical Outcome, Objective, or Performance Measure is indicated by a higher relative weight.

•	**1.0 Excellence in Science & Technology**		**60%**
	- Objective 1.1 Research Quality	40%	
	- Objective 1.2 Relevance to DOE Missions	10%	
	-Objective 1.3 Constructing & Operating Res. Facilities	40%	
	-Objective 1.4 Research Program Management	10%	
•	**2.0 Communications and Trust**		**5%**
	- Objective 2.1 Responsiveness	30%	
	Measure 2.1.1 Strategic Communications		100%
	- Objective 2.2 Stakeholder Involvement	40%	
	Measure 2.2.1 Community Involvement Process		80%
	Measure 2.2.2 Community Advisory Council		20%
	- Objective 2.3 Understanding	30%	
	Measure 2.3.1 Stakeholder Relations Program		65%
	Measure 2.3.2 Speakers Program		35%
•	**3.0 Environment, Safety and Health Excellence**		**10%**
	- Objective 3.1 Environmental Excellence	30%	
	Measure 3.1.1 Compliance		70%
	Measure 3.1.2 Prevention/Minimization		30%
	- Objective 3.2 Org and Mgmt Systems Excellence	70%	
	Measure 3.2.1 ISMS Milestones		80%
	Measure 3.2.2 EMS & GPIIP		20%
•	**4.0 Leadership and Management**		**25%**
	- Objective 4.1 Leadership	20%	
	Measure 4.1.1 Diversity		10%
	Measure 4.1.2 Personnel		20%
	Measure 4.1.3 Quality of Work-Life		10%
	Measure 4.1.4 Integrated Assessment		45%
	Measure 4.1.5 Corporate Leadership		15%
	- Objective 4.2 Infrastructure	20%	
	Measure 4.2.1 Space Consolidation		25%
	Measure 4.2.2 Facilities Management		25%
	Measure 4.2.3 Project Management		50%
	- Objective 4.3 Environmental Stewardship	40%	
	Measure 4.3.1 Restoration Program		40%
	Measure 4.3.2 Environmental Mgmt. Schedule		30%

Measure 4.3.3 Effect/Efficient Waste Mgmt		25%
Measure 4.3.4 Disposition of Excess Mat.		5%
- Objective 4.4 Business Operations	20%	
Measure 4.4.1 Bus Mgmt Inf Systems		25%
Measure 4.4.2 Process Improvement		10%
Measure 4.4.3 Business Infrastructure		30%
Measure 4.4.4 Computer Security		35%

DOE Evaluation

The DOE evaluation of the Contractor's performance, and in turn, the DOE determination of the Contractor's Fee, will be based primarily on the performance levels achieved against the weighted Performance Measures identified above. In addition, for each Critical Outcome area, the Contracting Officer will also consider the Laboratory's performance against the Other Contract Expectations of Attachment 3 and any other relevant information directly related to the Critical Outcome which is deemed to have had an impact (either positive or negative) on the Contractor's performance. Should the Contracting Officer consider other relevant information, including performance against the Other Contract Expectations in Attachment 3, in establishing the final performance rating for any Critical Outcome, the Contractor will receive written notice of such intent and will be given the opportunity to respond in writing. Further, the parties agree that the score, which results from an evaluation of the Contractor's performance against the weighted Critical Outcomes, Objectives, and Performance Measures of Appendix B can be changed by no more than +/- 0.15 at the Critical Outcome level if the Other Contract Expectations of Appendix 3 are utilized by the Contracting Officer in establishing the final performance rating for a Critical Outcome. This agreement does not impact DOE's rights under Article 6 – Paragraph (f) of the Prime Contract.

Change Control

Both DOE and BSA acknowledge that implementation of this performance-based contract will require both parties to continually refine selected Performance Measures, develop appropriate metrics, implement data collection and reporting mechanisms, and establish benchmarks against which to set targets for performance improvement and/or measurement. It is also recognized that a continuing effort is needed to refine the system for scoring performance in each of the Critical Outcomes included in this Appendix and for integrating these scores into an overall evaluation rating for each performance period. Therefore, a change-control process will be used by DOE and BNL to manage the content of this contractual document.

Performance Measure Development

The following concepts were used in the development of the Performance Measures and are provided for information and clarification in the process.

1. Critical Outcomes and their underlying Objectives, Performance Measures should influence the improvement agenda of the Laboratory. They should incorporate best practices and reflect the DOE and BNL functional manager's judgment as to the key performance elements for overall successful operations. Best practices should include cost/risk/benefit effectiveness. Examples of key elements addressed are:

    - Quality of product
    - Timely delivery
    - Cost reduction
    - Cycle time reduction
    - User friendliness
    - Meet DOE requirements

2. Performance Measures should be results-oriented and should include criteria which are objectively measurable and allow for meaningful trend and rate of change analysis where possible, and use qualitative criteria in those cases where objective criteria will not produce meaningful evaluation results.

3. Measures may reference industry business standards that are meaningful, appropriate and consistent with DOE requirements rather than arbitrary standards. To this end, benchmarking initiatives are encouraged. Setting benchmarks and targets should consider whether it is cost-effective to make further improvements or if the target level should be raised.

4. The relative weighting and metric for each Performance Measure shall be established prior to the start of the performance measurement period by mutual agreement of the Contractor and the DOE Contracting Officer. If the parties cannot reach agreement, the Contracting Officer shall have the right to establish such weights, subject to the provisions outlined in Article 7 of the Prime Contract.

5. Management approach, assumptions (including definitions), and performance rating levels shall be documented as appropriate.

6. Measures are to be developed in a team approach involving DOE personnel and Laboratory functional managers. Care should be taken to ensure that Laboratory functional managers are accountable for the resulting measures, reflecting their status as those responsible for performance and improvement.

7. Not including a Performance Measure does not diminish the need to comply with contractual requirements in that area of performance. Failure to comply with a significant contractual requirement may result in the Contracting Officer overriding the performance measures.

8. The Director of the Office of Science (SC-1) has the primary responsibility for evaluating Science and Technology performance (Critical Outcome 1), but practical input also will be sought from cognizant DOE Assistant Secretaries, Office Directors, and Program Managers. The Contracting Officer has the primary responsibility for evaluating performance relative to Critical Outcomes 2 through 7 in accordance with the Objectives, Performance Measures, and metrics of Attachment 1and the Other Contract Expectations of Attachment 3 to this Appendix B. However, the Contracting Officer shall inform SC-1 of any issues or concerns that should be considered when evaluating the Contractor's performance in Critical Outcome 1. This is especially important in those areas where operational performance could have a significant impact on the Contractor's ability to conduct successful research for the Department. The Contractor has responsibility to compile the data necessary to document its performance against all measures.

Critical Outcome 1: Basic Science & Technology

BNL WILL DELIVER INNOVATIVE, FOREFRONT SCIENCE AND TECHNOLOGY ALIGNED WITH DOE STRATEGIC GOALS IN A SAFE, ENVIRONMENTALLY SOUND, AND EFFICIENT MANNER AND WILL CONCEIVE, DESIGN, CONSTRUCT, AND OPERATE WORLD-CLASS USER FACILITIES.

The weight of this Outcome is 60% of total.

Cognizant DOE Assistant Secretaries and Office Directors have primary responsibility for evaluating the performance of Laboratory Science and Technology programs. In carrying out this responsibility, the Assistant Secretaries and Office Directors are likely to request assistance from the Program Managers under whose jurisdiction the various individual Laboratory programs fall.

In performing this evaluation, the Assistant Secretaries and Office Directors have available input from the following sources:

1. DOE Program Managers who carry out periodic reviews of the programs they fund. These reviews usually include use of independent technical experts. The Program Managers may use written reviews as a basis for evaluating the quality of the science and technology performed by the Laboratory and its relevance to their programmatic goals.
2. The Science and Technology Advisory Committee of the BSA Board which oversees the internal reviews of science and technical programs at Brookhaven. Independent review committees whose membership is drawn from the external scientific and engineering communities review each major Laboratory program on an 18-month cycle. The committees evaluate Laboratory divisions and programs with respect to the quality and performance of the staff, the quality and timeliness of the work, and the relevance of the programs to the goals of the Laboratory and sponsoring agencies. Reviews include consideration of the Performance Measures described below. The Committees' written reports and the Laboratory's responses are made available to the BSA Board for Brookhaven, DOE Contracting Officers, and to relevant DOE Program Managers.
3. In addition, input from Advisory Committees reporting to the cognizant DOE Assistant Secretary or Office Director that are appointed formally through the Federal Advisory Committee Act, from reviews of relevant Laboratory activities requested for the Secretary of Energy, or from cognizant Assistant Secretaries and Office Directors may be used.
4. Department Self-Assessments, which include Independent Peer Review and Department and Lab-level Annual Self-Evaluations.

Objectives and Performance Measures:

1.1 Quality of Research

The weight of this Objective/Measure is 40%.

Reviewers will evaluate the overall quality of the research performed. Depending on the nature of the program, reviewers will consider the following:

Science: Success in producing original, creative scientific output that advances fundamental science and opens important new areas of inquiry; success in achieving sustained progress and impact on the field, and recognition from the scientific community, including awards, peer-reviewed publications, citations, and invited talks.

Technology: Whether there is a solid technical base for the work, the intrinsic technical novelty of the research, the importance of technical contributions made to the scientific and engineering knowledge base underpinning the technology

program, and recognition from the technical community.

1.2 Relevance to DOE Missions and National Needs

The weight of this Objective/Measure is 10%.

Reviewers will consider whether the research fits within and advances the missions of DOE; contributes to U. S. leadership in the international scientific and technical communities; contributes to the goals and objectives of the Strategic plans of DOE and other national programs; and the extent of productive interaction with other Science and Technology programs. Depending on the nature of the program, reviewers will consider the following:

> Science: The program's track record of success in making scientific discoveries of technological importance to DOE missions and U.S. industry, the degree of industrial interest in follow-on development of current research results, and the effective use of national research facilities that serve the needs of a wide variety of scientific users from industry, academia, and government laboratories.
>
> Technology: The value of successfully developing pre-commercial technology to DOE, other federal agencies, and the national economy, the program's risks and costs, and where appropriate, the degree of industrial interest, participation, and support.

1.3 Success in Constructing and Operating Research Facilities

The weight of this Objective/Measure is 40%.

Reviewers will consider whether the construction and commissioning of new facilities is on-time and within budget, whether facility performance specifications and objectives are achieved, the reliability and safety of operations, adherence to planned schedules, and the cost-effectiveness of maintenance and facility improvements.

Reviewers will also assess the quality, innovation and achievements in designing and developing new facilities that will provide the next generation of research tools.

Reviewers of user facilities will also consider whether the user access program is effective, efficient, and user-friendly, the quality of the proposal evaluation process, the strength and diversity of user participation, the productivity of the research supported, both in science and technology, and the level of satisfaction among user groups.

Reviewers will consider the extent to which BNL provides effective and efficient leadership in the development of the Spallation Neutron Source (SNS) Project. In this project the Laboratory will perform assigned tasks and produce scheduled deliverables for the Spallation Neutron Source in accordance with the Inter-lab Memorandum of Agreement (MOA) and the approved annual work plans. Expectations for BNL performance in this area are reflected in the following Table.

Outstanding	Deliver annual work plan elements below cost and ahead of schedule.
Excellent	Deliver annual work plan elements on cost and schedule, including up to 50% of contingency.
Good	Deliver annual work plan elements within BNL project cost and/or schedule, including greater than 50% but less than or equal to 100% of contingency.
Marginal	Delivery of annual work plan elements exceeding cost and/or schedule, including contingency, such that BNL project critical path is impacted.

Unsatisfactory	Delivery of annual work plan elements exceeding cost and/or schedule, including contingency, such that overall SNS project critical path is impacted.

1.4 Effectiveness and Efficiency of Research Program Management

The weight of this Objective/Measure is 10%.

Reviewers will consider the quality of research plans; whether technical risks are adequately considered; whether use of personnel, facilities, and equipment is optimized; success in meeting budget projections and milestones; the effectiveness of decision-making in managing and redirecting projects; success in identifying and in avoiding or overcoming technical problems; the effectiveness with which technical results are communicated to maximize the value of the research results and to gain appropriate recognition for DOE and the Laboratory; effectiveness in developing, managing, and transferring to industry intellectual property and technical know-how associated with research discoveries; and the degree to which customer and stakeholder expectations are consistently met.

Critical Outcome 2: Communications and Trust

BNL WILL BE RECOGNIZED AS A COMMUNITY ASSET, A GOOD NEIGHBOR, AND A VALUED EMPLOYER.

The weight of this Outcome is 5% of total.

Objectives and Performance Measures:

The following metric applies to all Performance Measures in this Critical Outcome:

BNL and BHG will conduct a peer review process to evaluate all of the activities enumerated under each of the Objectives and Performance Measures contributing to this Critical Outcome. This peer-review will engage qualified, experienced, outside experts who will evaluate programs on an annual basis using Baldrige Criteria, Integrated Safety Management Principles, as applicable, and other relevant criteria appropriate to their state of development. Consistent with DOE expectations, a Baldrige scoring system will be used. The primary focus of this evaluation will be on evaluating program improvement. Following the peer-review, DOE-BHG will evaluate Laboratory performance relative to the Performance Measures below based on the information generated.

Consistent with the contract Scope of Work and Off-Ramp provisions the Peer-Review will examine the following key overall questions with respect to the BNL Programs:

- Is there evidence of organizational and cultural change regarding community involvement, i.e. development and implementation of a strong, integrated and proactive community involvement/communications program?
- Is there evidence of the community's increased understanding and respect for the Laboratory's missions and its contribution to science and technology?
- Are there evaluations that support the success of the community involvement initiatives?
- Are there indications that the community is satisfied that their substantive concerns are being adequately addressed?
- Are there reports from the community of positive and multiple relationships with the Laboratory?
- Is the overall BNL program likely to promote achievement of long-range goals?
- Have the Strategic Communications Plan, community involvement plans, and associated activities accomplished the work listed therein and has this work been done in an effective and efficient manner? Does a comparison of the BNL communications programs with other public and private communications programs reveal that BNL programs meet professional standards for prudent and effective communications?
- To what extent are the target audiences, stakeholders, and customers satisfied with the results of BNL's programs?

The key aspects of the Communications Program at BNL are presented below in the Performance Measures. They focus largely on developing the institutional-level operating infrastructure needed to underpin the entire program. It is expected that each element of the Communications Program at BNL will have associated self-assessment activities in the appropriate organizations (i.e.: CIGPA, Departments, and Divisions). These activities and the resulting findings and conclusions will be made available to the Peer-Review team. It is further expected that there will be regular community and employee surveys and follow-ups, the results of which will also be made available to the Peer-Review team (e.g. for the FY99 peer review, the team will review results from comprehensive, Lab-sponsored surveys and the Laboratory's follow-up actions).

2.1 Responsiveness

Enhance the responsiveness and effectiveness of Laboratory communications with internal and external stakeholders.

The weight of this Objective is 30%.

2.1.1 Strategic Communications Plan

The weight of this Performance Measure is 100%.

Discussion: The FY00 Strategic Communications Plan is an overall compilation of the Lab's proposed communications activities for FY00. The review shall focus on the overall effectiveness, appropriateness and quality of the deliverables of the communications elements of the major programs listed below.

- BGRR Community Involvement/Communications Program
- RHIC (community involvement, local concerns)
- HFBR
- OU I Community Involvement/Communications Plan
- OU III Community Involvement/Communications Plan
- OU V Community Involvement/Communications Plan
- Elected Official Outreach
- Media Relations Strategy

Together, these complex programs detail activities, milestones, meetings, and communications products (brochures, releases, etc.) which contribute to the achievement of enhanced responsiveness.

2.2 Stakeholder Involvement

Create opportunities for stakeholder involvement and participation in Laboratory decision-making processes.

The weight of this Objective is 40%.

2.2.1 Lab-wide Community Involvement Process

The weight of this Performance Measure is 80%.

The Laboratory will take appropriate steps to involve employees, with special focus on line managers, in an interactive process with the community. This process will be guided by BNL's Community Involvement Plan and Handbook to ensure that stakeholders' views on significant issues are solicited, discussed, analyzed and ultimately become part of the decision-making process, as appropriate, with feedback supplied to the community on a timely basis. Feedback to the community will signal the process/decision/action cycle.

Phase One of Plan implementation will include the incorporation of the Plan and Handbook into the Standards-Based Management System, the modification of Level I and II managers R2A2s to include responsibility for community involvement, and community involvement training for these managers. Additionally, the Laboratory will be expected to demonstrate line management understanding and commitment to the Community Involvement Plan and Handbook by using the model and guidance in these documents to involve the community in three (3) issues/projects or programs. Particular emphasis will be given to those projects and programs identified to be of importance by the community or which are likely to have a direct impact on the community. Reviewers will evaluate the Laboratory's success in incorporating the community involvement process into its management systems and R2A2s . Reviewers will also consider how effectively line managers use the Plan to involve the community in their decision-making activities and the timeliness and appropriateness of their response to stakeholder feedback.

2.2.2 Community Advisory Council

The weight of this Performance Measure is 20%.

The Laboratory will fully support the functions of the CAC such as supplying a facilitator, arranging and preparing presentations on a wide range of topics of interest to CAC members, calendar management and meeting organization, response to data requests, correspondence management, etc. in an efficient and timely manner. The Laboratory will also support subcommittees and task forces formed by the CAC as well as panel discussions and special events of interest to CAC members and the community. Feedback from Council membership will be provided to, or independently gathered by, reviewers for consideration in the evaluation.

2.3 Understanding

Achieve a better understanding between internal and external stakeholders.

Understanding that each of the programs in this section depend on volunteers, reviewers will evaluate the Laboratory's success in targeting and reaching individuals and organizations, who/which have been underrepresented in the Laboratory's community relations programs or who/which provide opportunities for the Laboratory. The goal of these programs is to inform and educate a wider spectrum of the community about the Laboratory's world class scientific research and its commitment to operational excellence and to receive valuable feedback from these constituencies that can be used to improve and enhance the Laboratory's community relations programs.

The weight of this Objective is 30%.

2.3.1 Stakeholder Relations Program

The weight of this Performance Measure is 65%.

The Laboratory will establish a Stakeholders Relations Program, which will capture significant contacts with stakeholders through outreach activities, the envoy, ambassador and speakers' bureau, the Community Advisory Council and its subcommittees and the Brookhaven Executive Roundtable.

Phase One of the Stakeholder Relations Program will include the creation of a database of stakeholders and the identification of ten Laboratory managers/staff and five DOE Brookhaven Group staff to actively participate in the program. These fifteen people will be asked to routinely contact targeted stakeholders and to report on these contacts through the database. It is anticipated that contact information might include information requested by the stakeholder and a date for a response, issues of interest and other relevant feedback concerning Laboratory projects, issues and programs. Feedback from the Envoy, Ambassador and Speakers' Bureau programs and information from the Laboratory's Outreach and Community Involvement programs will also be included in the database.

2.3.2 Speakers Bureau

The weight of this Performance Measure is 35%.

Discussion: BNL will continue to send informed and skilled speakers to various civic groups and clubs over the course of the year. The Laboratory placed 50 speakers during the first 10 months of FY99. The annual total is estimated at 60 for FY99. Presentations have been made primarily to civic associations, senior citizens groups, and business organizations. Activities to stimulate requests for BNL speakers will be aimed at achieving placement of 70 speakers before the community during FY00.

Critical Outcome 3: Environment, Safety and Health Excellence

BNL WILL CONDUCT ALL WORK AND OPERATE ALL FACILITIES WITH DISTINCTION, FULLY INTEGRATED WITH AND SUPPORTIVE OF ITS SCIENCE, TECHNOLOGY AND CLEANUP MISSIONS, WHILE BEING FULLY PROTECTIVE OF ITS WORKERS, USERS, THE PUBLIC AND THE ENVIRONMENT.

The weight of this Outcome is 10%

Objectives and Performance Measures:

BNL will achieve excellence in operational worker safety and health, and in environmental protection.

In addition to the Performance Measures under Objective 3.1, which directly relate to operational ES&H performance, accountability for ES&H performance is implemented or reinforced by several other mechanisms. For example, the Performance Measures under Objective 3.2 address management systems that are directly related to the implementation of ES&H initiatives, and Performance Measures under Critical Outcome 4 address environmental restoration projects and waste management. Also, meeting ES&H expectations will have significant impacts on program performance evaluations under Critical Outcome 1.

Finally, Attachment 3 entitled "Other Contract Expectations" and other clauses in this Contract establish performance expectations and require compliance with a variety of ES&H Standards. Failure under these clauses can have significant contractual impacts independent of the performance ratings. Such impacts vary and may include unilateral alteration of the performance ratings assigned in this Attachment.

3.1 Environmental Excellence

Achieve integration of environmental stewardship into all facets of the Laboratory's missions, and manage programs and operations in a manner that protects the ecosystem and public health.

The weight of this Objective is 30%.

The Environmental Stewardship Critical Outcome is also related to achievement of this Objective. Implementation of the Environmental Management System and GPIIP milestones are addressed in the Management System Improvement Composite.

Definitions for measures with milestones:
Ahead of schedule: 30 calendar days or more early
On schedule: within 29 calendar days of scheduled delivery of milestone
Minor schedule variance: between 30 – 59 calendar days on any milestone
Significant schedule variance: missing a milestone by more than 60 calendar days
Marginal quality: requires substantial re-work based on EPA/DOE written comments on any milestone.

Each milestone will be awarded points as follows, based on the accomplishment of that milestone.

Outstanding = 4 points
Excellent = 3 points
Good = 2 points
Marginal = 1 point
Unsatisfactory = 0 points

The evaluation of the performance measure will be the numerical average of the scores of the supporting milestones.
Note: These measures have been drafted based upon the assumption that priorities in FY00 will not change (i.e., that no new, urgent high risk activity like the HFBR incident will result in DOE directing

BNL to spend allocated dollars elsewhere). If such a change should occur, the measures will be renegotiated as necessary. Baseline Change Proposals will be used to identify significant change in baseline assumptions, with appropriate changes made to goals.

Performance Measures

3.1.1 Achieve or maintain compliance with applicable environmental protection requirements.

The weight of this Performance Measure is 70%

3.1.1.1 Close Underground Injection Control Devices
3.1.1.2 Identify and Implement Corrective Measures to Achieve Conformance with Article 12 Memorandum of Agreement (MOA)

Scoring of this measure: Total = .5(3.1.1.1) + .5(3.1.1.2)

3.1.1.1 Close Underground Injection Control Devices

Discussion: Continued development and implementation of BNL's Groundwater Protection Program is a high priority. A key aspect of this program is compliance with the provisions of environmental regulations such as Underground Injection Control (UIC) and conformance to the Article 12 provisions in the MOA with Suffolk County Department of Health Services (SCDHS) designed to protect groundwater from contamination. Closure of UICs will limit potential liability for improper discharges to groundwater (by removing the pathway) and will reduce the regulatory burden of UIC permitting and monitoring. It should be noted that all technical difficulties associated with closing UICs are not known. EPA has issued a Consent Order to bring BNL into compliance with UIC requirements.

Scoring and Performance Rating Levels:

Rating Levels	Performance
Outstanding	>80 % of UICs closed
Excellent	70-79% of UICs closed
Good	60-69% of UICs closed
Marginal	50-59% of UICs closed
Unsatisfactory	<50% of UICs closed

Assumptions:
1. Number of UICs in universe is 54. This number does not include UICs closed prior to FY99.
2. Funding is released before 01/01/00.
3. "Closed" means the UIC has been sampled if necessary, and an appropriate and complete package has been submitted to the regulatory agency in compliance with applicable requirements.

3.1.1.2 Identify and Implement Corrective Measures to Achieve Conformance with Article 12 Memorandum of Agreement

Discussion: DOE has an MOA with SCDHS regarding conformance with Article 12 provisions. Conformance with the technical provisions of Article 12 is a key aspect of BNL's Groundwater Protection Program. Line organizations will identify and implement corrective measures geared towards bringing BNL into conformance with applicable provisions of Article 12. These corrective measures will be listed in the Tanks Database maintained by Plant Engineering and the Environmental Services Division. The technical and administrative aspects of Article 12 will be prioritized with SCDHS. A project plan will then be developed

that addresses the highest priority actions. The project plan will include a scope and schedule to facilitate funding requests to ensure conformance with the MOA.

Measure: Define the scope and schedule for conforming to the high priority provisions of Article 12, and implement the corrective measures scheduled and funded for FY00.

Measure B Scoring:

Rating Levels	Performance
Outstanding	90% or more of the corrective measures that have been prioritized, scheduled, and funded for FY00 have been implemented.
Excellent	70-89% of the measures that have been prioritized, scheduled, and funded for FY00 have been implemented.
Good	50-69% of the measures that have been prioritized, scheduled, and funded for FY00 have been implemented.
Marginal	20-49% of the measures that have been prioritized, scheduled, and funded for FY00 have been implemented.
Unsatisfactory	0-19% of the measures that have been prioritized, scheduled, and funded for FY00 have been implemented.

Assumptions:
A "tank" is a storage facility as defined by Article 12. CERCLA tanks will not be included in the Article 12 project plan as they are handled separately under the IAG.
The list of tanks considered under this measure will be provided to DOE by 11/1/99.

3.1.2 Integrate pollution prevention/waste minimization and resource conservation into all planning and decision-making. Adopt cost-effective practices that eliminate, minimize or mitigate environmental impacts. Environmental effluents, emissions and wastes are as low as reasonably achievable.

The weight of this Performance Measure is 30%.

Meet critical goals and milestones in the EPA Phase II Process Evaluation Project. Institutionalize program.

Discussion: The Process Evaluation Project is part of the Memorandum of Agreement with EPA. High priority process evaluations were completed in FY99. The remainder are scheduled for FY00. A number of corrective actions have been identified during the process evaluations, and they are tracked in a database.

The process evaluation approach is being institutionalized via implementation of Planning and Control of Experiments (1.3.5), Work Planning and Control for Operations (1.3.6), and Facility Design Review process. The environmental/pollution prevention focus of these programs can be strengthened. The Environmental Compliance Representative (ECR) program will also help institutionalize the process evaluation approach.

Measure:
- Complete balance of PEP process evaluations by 2/28/00. (See Table A)
- Issue PEP Final Report by 6/28/00. (See Table A)
- It can be demonstrated that environmental expertise is involved in experimental review/work planning, as needed, to assist in institutionalizing process evaluations into new work. Demonstration means that either an ECR was involved in the process (e.g., on the Experimental Review Committee and involved in 1.3.6 work planning process), or it can be demonstrated by other means that significant environmental aspects and pollution prevention opportunities were identified and addressed as appropriate during review/work

planning (e.g. procedures are in place to ensure that the appropriate environmental expertise is brought in when necessary). (See Table B)

- Percentage of corrective actions identified in FY99 PEP process evaluations are closed. (See Table C).

Scoring: Add the scores for Table A, B, and C and divide by 3 to achieve the final rating level per Table D.

Table A (PEP Milestones)

Score	Performance
5	Acceptable quality and ahead of schedule.
4	Acceptable quality and on schedule.
3	Acceptable quality and minor schedule variance.
2	Marginal quality or significant schedule variance.
1	Marginal quality and significant schedule variance.

Table B (Demonstrating involvement of environmental expertise in 1.3.5 and 1.3.6 process)

Score	Performance
5	Directorate demonstrates involvement by 11/30/99
4	Directorate demonstrates involvement it by 12/30/99
3	Directorate demonstrates involvement by 1/30/00
2	Directorate demonstrates involvement by 2/28/00
1	Directorate can not demonstrate involvement by 3/30/00

Scores for all Directorates are tabulated and divided by number of Directorates to obtain average score for Table B.

Table C (% of corrective actions identified in FY99 closed)

Score	Performance
5	>90% of corrective actions closed.
4	70-89% of corrective actions closed.
3	50-69% of corrective actions closed.
2	25-49% of corrective actions closed.
1	< 25% of corrective actions closed.

Table D

Rating Level	Score from Table A+B+C/3 = Table D Score
Outstanding	4.0-5.0
Excellent	3.0-3.9
Good	2.0-2.9
Marginal	1.0-1.9
Unsatisfactory	0-0.9

Assumptions:
None

3.2 Organization and Management Systems Excellence

BNL will develop and implement next generation management systems and establish the necessary organizational constructs to ensure continuous improvement in ES&H performance and operations support.

The weight of this Objective is 70%

3.2.1 Key ISMS Milestones

The weight of this Performance Measure is 80%

Scoring of this measure: Total = .50(3.2.1.1) + .50(3.2.1.2)

3.2.1.1 ISMS Project Goals

The scoring for this measure will be based on the numeric average of the performance on the three goals.

- BNL issues ISMS Program Description

Outstanding	11/30/99
Excellent:	01/30/00
Good	2/29/00
Unsatisfactory	3/31/00

- BNL declares it's readiness for ISMS Phase 1 and Phase 2 Verification

Outstanding:	5/1/00
Excellent:	7/1/00
Good	6/1/00
Unsatisfactory	7/1/00

- BNL achieves ISMS Phase 1and Phase 2 Verification

Outstanding:	6/30/00
Excellent:	9/30/00
Good	10/31/00
Unsatisfactory	11/30/00

3.2.1.2 Critical ISMS Quantitative Measures

Work Planning and Control

- ESH STD 1.3.5: Based on an assessment for each Department during the fourth quarter FY 2000 of all active experiments, the percent of experiments with current, formally approved ESH STD 1.3.5 documentation.
- ESH STD 1.3.6: Based on an assessment performed by the Work Control working group, of a representative sample of work packages during one week in the fourth quarter FY 2000, the percent of applicable activities for which the work permit process was complete (all hazards identified, controls (including training and monitoring if applicable) identified, approval signatures complete).

The rating for ESH STD 1.3.6 will be based on the numerical average of the two sub-elements. The rating for the entire measure will be based on the numeric average of the ESH STD 1.3.5 and 1.3.6 bullets.

Metric:
Outstanding: >= 95%
Excellent: 90% to < 95%
Good: 85% to < 90%
Marginal: 80% to < 85%
Unsatisfactory: < 80%

3.2.2 Continue development of, and implement Environmental Management System, and fully implement Groundwater Protection Program.

The weight of this Performance Measure is 20%.

Discussion: Finalizing development and completing implementation of BNL's Environmental Management System will ensure that environmental considerations are fully integrated into the way BNL operates. It will also ensure that commitments in the EPA Memorandum of Agreement are met (Phase III). The path forward to implementing EMS is laid out in the EMS Project Plan. BNL expects to achieve registration for the Lab as a whole by the end of FY01.

The Groundwater Protection Implementation and Integration Plan (GPIIP) describes tasks needed to further integrate the existing Environmental Restoration Groundwater Monitoring program with the environmental surveillance/active Facility Monitoring program. Proceeding with other high priority tasks in the GPIIP is essential to furthering integration of the groundwater programs on-site in an effort to increase their effectiveness and efficiency, and to ensuring a smooth transition of the groundwater program from EM to a landlord function in the future. The GPIIP will be rebaselined as necessary in September of 99. Full implementation will be defined by completion of DQOs and EIMS database integration, with a project review/self-assessment on progress.

Measure:
Meet key milestones of the EMS Project Plan and the GPIIP.

- Laboratory-wide EMS deployment complete, 7/01/00.
- Laboratory self declares conformance to ISO 14001, 9/30/00 (after independent assessment).
- Select facilities (Reactor Operations Division, Environmental Management Directorate, Collider Accelerator Complex, and BLIP) achieve ISO 14001 registration, 9/30/00.
- Establish Environmental Information Management System as the repository for all BNL groundwater data by June 30, 2000.
- Optimize monitoring by conducting the Data Quality Objective process on the groundwater-monitoring network by September 30, 2000.
- Conduct a project review/self-assessment of implementation of components of the GPIIP by 9/30/00.

Scoring:
Each milestone will be awarded points as follows based on the accomplishments of that milestone:

Outstanding = 4 points
Excellent = 3 points
Good = 2 points
Marginal = 1 point
Unsatisfactory = 0 points

The evaluation of the performance measure will be the numerical average of the scores of the supporting milestones.

Rating Levels	Performance
Outstanding	Acceptable quality and ahead of schedule.
Excellent	Acceptable quality and within milestone.
Good	Acceptable quality and minor schedule variance
Marginal	Marginal quality or significant schedule variance.
Unsatisfactory	Marginal quality and significant schedule variance.

Assumptions:

- Assumptions for each milestone are listed in the GPIIP dated April 30, 1999.
- Milestones will be rebasedlined at the end of FY 99 in consultation with DOE, and measures will be revised accordingly.
- On-going discussions between BNL and DOE to coordinate various assessments may result in changes in EMS project dates to accommodate all programmatic needs and achieve efficiencies.

Definitions:
Ahead of schedule: 30 calendar days or more early
On schedule: within 29 calendar days of schedule delivery of milestone
Minor schedule variance: between 30 – 59 calendar days on any milestone
Significant schedule variance: missing a milestone by more than 60 calendar days
Marginal quality: requires substantial re-work based on EPA/DOE written comments on any milestone.

Critical Outcome 4.0: Leadership and Management

BNL WILL BE RECOGNIZED BY ITS USERS, STAFF, STAKEHOLDERS, AND CUSTOMERS AS HAVING THE HIGHEST QUALITY LEADERS AND STAFF; BEING AN EXEMPLARY ENVIRONMENTAL STEWARD; AND SUPPORTING ITS MISSIONS WITH THE BEST BUSINESS PRACTICES, COMPUTING SERVICES, INFRASTRUCTURE, AND INFORMATION MANAGEMENT SYSTEMS.

The weight of this Outcome is 25% of total.

Objectives and Performance Measures:

4.1 Leadership

BNL will be recognized by DOE, users, and BNL Staff as the National Laboratory with the highest quality leaders and the most effective and efficient management.

The weight of this Objective is 20% of total.

4.1.1 Diversity

Create a pool of diverse leaders/managers. Maintain/Improve the Diversity Profile of the Laboratory

The weight of this Measure is 10%.

Measure: Increase representation of under-represented minorities and females employed in two job groups: Officials & Managers and Professionals.

Metric: Increase representation of females and minorities by percentage from the below table by achieving or exceeding the rate of entry into each of two EEO categories for women and minorities. A percentage of the availability (A) for each of the groups determines the performance level.

Performance Level	Entry Rate Range as % of Availability (A)	Minimum Entry Rate of Entry Rate Range (Percentage of Hires and Promotions into Group)			
		Officials & Managers		Professionals	
		Women (A=25.5)	Minorities (A= 15.8)	Women (A=35.6)	Minorities (A=16.9)
Outstanding	> 100% of A	24.2	15.0	33.8	16.1
Excellent	80 to 99% of A	23.0	14.2	32.0	15.2
Good	70 to 79% of A	20.4	12.6	28.5	13.5
Marginal	50 to 69% of A	15.3	9.5	21.4	10.1
Unsatisfactory	< 50% of A				

NOTE: Entry rate minimums are calculated using availability percentages from BNL's FY 1999 Affirmative Action Plan. Availability percentages may be adjusted slightly to reflect availability updates in BNL's FY 2000 plan, and the performance thresholds above may be impacted.

The overall score for Affirmative Action/Diversity will be calculated as the total of the scores from each of the four targeted groups weighted according to the table below:

EEO Group	% of Points
Officials and Managers – Women	25
Officials and Managers – Minorities	25
Professionals – Women	25
Professionals – Minorities	25

4.1.2 Personnel

Create a pool of talented, empowered, motivated, and goal-oriented leaders/managers to enhance the Lab's competitive position in the market for required talent and motivate employees to achieve the Lab's goals.

The weight of this Measure is 20%.

4.1.2.1 Strengthen Performance Appraisal and Goal Planning Process.
Measure: Degree to which non-bargaining unit staff have established goals for FY 2000 and quality of goals established

The weight of this element is 70%.

Metric:
Outstanding: 95% of level 1, 2, and 3 non-bargaining unit staff and 80% of all other such staff have established goals
Excellent: 95% of level 1, 2, and 3 non-bargaining unit staff and 60% of all other such staff have established goals
Good: 90% of level 1, 2,and 3 non-bargaining unit staff have established goals and 50% of all other such staff have goals
Marginal: 75% of level 1, 2, and 3 non-bargaining unit staff have established goals
Unsatisfactory: <75% of level 1, 2, and 3 non-bargaining unit staff have established goals

Note: New hire and terminating managers will be excluded from the base for these percentages.

4.1.2.2 Incorporate succession planning, job-training-analysis training and 360° Leadership feedback elements into the management goals of managers and supervisors.

The weight of this element is 15%.

4.1.2.2.1 Implement and Monitor Succession Planning Progress.

The weight of this sub-element is 30%.

Measure: Percent of Level 1 and 2 managers who have completed succession plans.

Metric:
All Succession Plans complete by 12/31/99 - Outstanding

>90% Succession Plans complete by 12/31/99 - Excellent
>90% Succession Plans complete by 3/31/00 - Good
>90% Succession Plans complete by 6/30/00 - Marginal
<90% Succession Plans complete by 6/30/00 - Unsat

4.1.2.2.2 Implement Job-Training-Analysis-based Training for Managers and Supervisors over the three-year period, 2000 through 2002.

The weight of this sub-element is 40%.

Measure: Percent of required courses completed by Level 1 and 2 Managers.

Metric:
40% Completed by 9/30/00 -Outstanding
33% Completed by 9/30/00 -Excellent
25% Completed by 9/3/0/00 -Good
18% Completed by 9/30/00 -Marginal
<18% Completed by 9/30/00 -Unsatisfactory

4.1.2.2.3 Develop Action Plans based on 360° Leadership Feedback Process results.

The weight of this sub-element is 30%.

Measure: Number of Level 1 and 2 manager with completed Action Plans.

Metric:
95% Action Plans complete by 1/31/00 - Outstanding
90% Action Plans complete by 3/31/00 - Excellent
75% Action Plans complete by 3/31/00 - Good
50% Action Plans complete by 6/30/00 - Marginal
<50% Action Plans complete by 6/30/00 - Unsatisfactory

4.1.2.3 Establish a Quality Review Board which samples the Lab-wide Appraisal process, assesses the consistency of application of the principles and precepts of the Compensation Program, evaluates the quality of all goals and recommends management corrective actions as appropriate.

The weight of this element is 15%.

Measure: Completion of Quality Review Board Charter actions during FY2000 including:
(a) Reviewing a sample of 100 employee performance appraisals.
(b) Providing feedback to those sampled regarding compliance with Lab appraisal principles and acceptability of goals.
(c) Correcting each appraisal and/or goals in accord with feedback.

Metric:
All three actions completed for entire sample - Outstanding
All actions completed for 75 - Excellent
All actions completed for 50 - Good
Completion the first 2 of the 3 actions for 50 - Marginal
Failure to meet conditions for Marginal - Unsatisfactory

4.1.3 Quality of Work-life

Provide a high quality work environment that enhances BNL's ability to retain and attract an excellent workforce.

The weight of this Measure is 10%.

Develop and implement a Career Development Planning Process

Measure: Career Development Plans (CDPs) prepared for staff from 3 pilot Directorates.

Metric:
Percentage of CDPs developed in 3 pilot Directorates.
95% completed by 6/30/00 - Outstanding
85% completed by 6/30/00 - Excellent
75% completed by 6/30/00 - Good
65% completed by 6/30/00 - Marginal
<65% completed by 6/30/00 - Unsatisfactory

4.1.4 Integrated Assessment

The Lab Integrated Assessment Program (IAP) shall be implemented to provide operational, technical, and business performance feedback.

The weight of this Measure is 45%.

4.1.4.1 Achieve the FY00 IAP key milestones and maintain or accelerate the critical path to program completion. These Integrated Assessment Program Milestones are:

a. Revised FY00 Self-Assessment (SA) Plans for Departments and Divisions approved by the Deputy Laboratory Directors by November 30, 1999.
b. Independent Oversight SA Review Program evaluation of at least 8 directorates and/or other organizations reporting directly to the BNL Director by September 30, 2000.

The weight of this element is 20%.

Metric:
The FY00 IAP deliverables focus on deployment and results from year two of the implementation of self-assessment. Meeting the project milestones above will be considered Excellent performance, and bettering a milestone by 30 days or more will comprise Outstanding performance for that milestone. Missing a milestone by up to 45 days will be considered Good performance for that milestone, but only if the critical path is not adversely affected. Missing a milestone by more than 45 days will be considered Marginal, and by more than 90 days will be considered Unsatisfactory performance for that milestone.

Each milestone will be awarded points as follows based on the accomplishment of that milestone:

Outstanding - 4 points
Excellent - 3 points

Good - 2 points
Marginal - 1 points
Unsatisfactory - 0 points

The evaluation of the Performance Measure will be the numerical average of the scores of the supporting milestones.

4.1.4.2 BHG rating of the Self-Assessment Program, within IAP, based on Independent Oversight reviews and overall program rating and supplemented by BHG-generated information.

The weight of this element is 80%.

Metric:
Outstanding - Overall SA Program rating of Outstanding
Excellent - Overall SA Program rating of Excellent
Good - Overall SA Program rating of Good
Marginal - Overall SA Program rating of Marginal
Unsatisfactory - Overall SA Program rating of Unsatisfactory

4.1.5 Corporate Leadership

The weight of this Measure is 15%.

Brookhaven Science Associates believes that active corporate involvement is a critical success factor in the management of BNL. To implement this, BSA is committed to the following types of activities at BNL:

- Providing highly skilled candidates for senior management positions at the Laboratory;
- Providing proven management systems and processes for enhancing business operations;
- Facilitating the implementation of these with long-term assignments of key leaders and short-term assignments of subject matter experts;
- Conducting management assessments in various areas of Laboratory operations;
- Providing strategic guidance to the science, technology and cleanup missions of the Laboratory

Metric:
BSA performance relative to this measure will be evaluated by the BHG Manager. Performance relative to each item will be determined as acceptable or unacceptable.

Performance related to the measure as a whole will be determined as follows:

Outstanding-	All 5 items determined acceptable
Excellent-	4 of the 5 items determined acceptable
Good-	3 of the 5 items determined acceptable
Marginal-	2 of the 5 items determined acceptable
Unsatisfactory-	1 or less of the 5 items determined acceptable

4.2 Infrastructure

BNL will conduct its business and manage laboratory facilities with distinction, fully integrated with the scientific and technological mission, while being fully protective of workers, public, and the environment.

The weight of this Objective is 20% of the total.

4.2.1 Space Consolidation

The weight of this Measure is 25%.

Measures consolidation of BNL mission activities from small, wood frame structures into existing, permanent, multi-use research facilities. BNL is planning to consolidate programs and support functions into facilities with lower occupancy over the next two years.

Percentage change in office occupancy.

Metric: The percentage change in office occupancy for the BNL's large permanent facilities will be calculated as:

$$OCC = OCC_{00} - OCC_{99}$$

$$OCC_{00} = \frac{\text{actual number of office occupants (FY00) x 100}}{\text{design office occupancy}}$$

$$OCC_{99} = \frac{\text{actual number of office occupants (FY99) x 100}}{\text{design office occupancy}}$$

OCC =				
	less than		1%	unsatisfactory
	1%	to	2.0%	marginal
	2.1%	to	3.0%	good
	3.1%	to	4.0%	excellent
	greater than		4.0%	outstanding

Building Number	Design Occupancy	Actual Occupancy 10/1/99	% Occupancy 10/1/99	Actual Occupancy 9/30/00	% Occupancy 9/30/00
463	112				
480	39				
490	185				
510/515	428				
535	84				
555	150				
815	74				
911	191				
Totals	**1263**				

Notes:.
a. Office occupants are employees and guests using/sharing the office at least 150 days per year.
b. Design office occupancy is per the Plant Engineering space database.
c. The following buildings will be measured (with their current data shown):

Building Number	Design Occupancy	Actual Occupancy 6/1/99	% Occupancy as of 6/1/99
463	112	96	85.7%
480	39	38	97.4%
490	185	102	55.1%
510/515	428	394	92.1%
535	84	74	88.1%
555	150	100	66.7%
815	74	56	75.7%
911	191	185	96.9%
Totals	1263	1045	82.74%

4.2.2 Facilities Management:

The weight of this Measure is 25%.

Condition Assessment Survey Progress

The physical condition of buildings and facilities will be surveyed and assessed (e.g., CAS inspections) over a reasonable time period, in accordance with DOE O 430.1A, "Life Cycle Asset Management" requirements.

The DOE goal is to conduct condition assessments of each building (cover the entire site) every five years. Currently, BNL is surveying buildings on about a ten-year cycle. This measure drives a two-year program to improve CAS inspection cycle time at BNL.

Measure:

Calculate the percentage of the site's buildings, by floor area (square footage), CAS inspected each fiscal year. Convert to cycle time.

Cycle time	Rating
>10 years	unsatisfactory
7–10 years	marginal
5 - 7 years	good
3 - 5 years	excellent
1 – 3 years	outstanding

4.2.3 Project Management:

Projects are managed to ensure scope, schedule and cost. Approved projects are completed on time, within budget, and meet baseline expectations. Uncosted carryovers are minimized.

The weigh of this Measure is 50%.

4.2.3.1 This Performance Measure is for all capital-funded construction projects, excluding Strategic Systems (formerly Major Projects and Major Systems Acquisitions) and EM Projects. It examines the percent of capital funds obligated and costed per fiscal year, the percent of projects on schedule and the number of capital construction projects with scope completed within the Total Estimated Cost (TEC). The formula for calculating the performance indicator is:

PROJECT RATING (PM):

$$(PM) = 0.2\ (a^1 + a^2) + 0.2\ (b^1 + b^2) + 0.2\ (c)$$

FY00 Performance Measure

(PM) =	less than	0.60	unsatisfactory	
	0.60	to	0.69	marginal
	0.70	to	0.79	good
	0.80	to	0.89	excellent
	0.90	to	1.00	outstanding

4.2.3.1.1 Funds Committed:

The weight of this element is 20%

$$(a^1) = \frac{\textit{Actual Funds Committed}}{\textit{Total Planned Funds Committed}}$$

Description of Proposed Method

Actual Present Year Funds [Line Item + GPP/IHEM] Committed
Total Planned [Line Item + GPP/IHEM] Committed

Notes

a. Measure funds commitment performance only for funds received in the fiscal year being measured.
b. Measure will not consider funds received late in fiscal year -- only funds received in financial plan during first quarter will be used in calculation.
c. Total planned funds committed excludes planned contingency funds (usually about 12%).
d. Only planned (requested) project funds will be included.
e. Funds committed (obligated) will continue to be measured when contracts and PO's are "pinned", as reflected in the B&E Report.

4.2.3.1.2 Funds Costed:

The weight of this element is 20%.

$$(a^2) = \frac{\textit{Actual Funds Costed}}{\textit{Total Planned Funds Costed}}$$

Description of Proposed Method

Actual Present Year Funds [Line Item + GPP/IHEM] Costed
Total Planned [Line Item + GPP/IHEM] Costed

Notes:

a. Measure funds costed performance for funds received in fiscal year being measured.
b. Measure will not consider funds received late in fiscal year -- only funds received in financial plan during first quarter will be used in calculation.
c. Only planned (requested) project funds will be included.

4.2.3.1.3 Project Schedule Compliance (GPP and IHEM)

The weight of this element is 20%.

(b^1) = *No. of GPP/IHEMs Completed on Schedule*
No. of GPP/IHEMs Scheduled to Complete

Description of Proposed Method:

1. BNL and DOE agree on actual completion milestone dates and document and track them in the Plant Engineering Monthly Project Report.
2. List all GPP and IHEM projects with TEC >$300K and completion milestones falling in current fiscal year.
3. Determine how many were completed on-time using construction "substantially complete" as complete.
4. "Substantially complete" means project is ready for beneficial occupancy or use, as described in the Project Management Control System.

Notes

a. GPP and IHEM project schedules will be established in cooperation with BHG in continuation of current approval process.

4.2.3.1.4 Project Schedule Compliance (Line Item)

The weight of this element is 20%.

$$(b^2) = \frac{\text{No. of Line Item Milestones}(^1)\text{ Completed on schedule}}{\text{No. of Line Item Milestones}(^1)}$$

(^{1}) Key controlled Milestones

Description of Proposed Method

1. BNL and DOE agree on actual baseline completion milestone dates and document and track them in the Plant Engineering Monthly Report.
2. List all Line Item projects with key controlled milestones falling in the current fiscal year.
3. Determine current year milestones completed on or ahead of schedule.

Notes

1. Key controlled milestones are those described in the approved Project Management Plan:
   - Design Start
   - Design Complete
   - Construction Start
   - Construction Complete
2. Construction complete is defined as "substantially complete."
3. "Substantially complete" means project is ready for beneficial occupancy or use, as described in the Project Management Control System.

4.2.3.1.5 Scope Completed Within Approved Baseline

(LINE ITEM, GPP AND IHEM [>300K])

$$(c) = \frac{\textit{Projects completed within Approved Baseline}}{\textit{Total Projects Complete}}$$

The weight for this element is 20%.

Description of Proposed Method

1. Review Line Item, GPP and IHEM (>$300K TEC) projects completed through the fiscal year.
2. Upon project completion, determine whether project baseline scope was completed within the approved baseline Total Estimated Cost (TEC).
3. Determine the total number of Line Item, GPP and IHEM (>$300K TEC) projects completed within approved baseline (approved original project and approved baseline change proposals)
4. Determine total number of projects completed.
5. Calculate:

$$(c) = \frac{\text{Projects Completed within Approved Baseline}}{\text{Projects Completed}}$$

Notes

a. Justifiable BCPs will be approved by DOE-BHG for legitimate scope changes or reductions (i.e., due to program changes, reasonable unforeseen project conditions, new regulatory requirements, etc.)
b. Plant Engineering is not currently managing any projects classified as "Strategic Systems" under LCAM (formerly Major Projects and Major System Acquisitions). Presently, the RHIC Project is the only such project at BNL.

4.3 Environmental Stewardship

BNL will become an exemplary environmental steward through efficient and effective waste management and by achieving the aggressive cleanup goals contained in DOE's "Paths to Closure" for BNL in advance of 2006, in a manner that engages stakeholders in planning and implementation of the cleanup process.

The weight of this Objective is 40%.

4.3.1 Restoration Program - Total Project Cost Reduction.

The weight of this measure is 40%

Reduce the Total Project Costs for the Environmental Restoration program through value engineering, optimized work sequences, and enhanced contracting strategies. The Laboratory will be innovative in its approaches to propose and implement cost reductions and/or schedule accelerations. The Laboratory, its employees, and its subcontractors fully endorse the concept of near-term program completion.

Performance Measure:

Formal reductions to Total Project Costs (TPC) for the BNL Environmental Restoration program. The TPC as of 9/30/00 is compared to the TPC from the conclusion of previous fiscal year (9/30/99). Changes to TPC are formally recognized through DOE's Baseline Change Control processes and procedures.

Performance Level	Metrics
Outstanding	Reduce TPC $25M or more
Excellent	Reduce TPC $20-25M
Good	Reduce TPC $10-20M
Marginal	Reduce TPC $0-10M
Unsatisfactory	Increase TPC

Assumptions:

- TPC is the contractor's planned baseline cost for the Environmental Restoration Program including approved contingency[1]. The program is recognized as the EM baseline, scheduled for completion by FY 2006. Long-term monitoring costs beyond FY 2006 are not to be considered in this measure. The DOE and the Laboratory maintain the BNL TPC through formal change control processes and procedures. As such, BSA formally records DOE approved changes to the TPC in the Laboratory's monthly project reports. Only Baseline Change Proposals (BCPs), submitted by the Laboratory prior to 9/30/00 and approved by DOE can be considered for this measure[2].
- For purposes of FY 2000 performance assessment, any "new" EM scope, formally adopted by DOE-CH into the project baselines during FY 2000, will not be considered in assessing the above expectation. For example, DOE-CH acceptance of new scope which was not even indirectly addressed by the Laboratory in developing its risk based contingency will not offset proposed baseline cost reductions. Examples would be the adoption of surplus facilities (Bldgs. 650 or 811), newly accepted waste inventories, and the A/B Waste Lines which DOE expects to formally accept into the BNL EM program through a future Baseline Change Control Board (BCCB) action. It is further noted that the Laboratory has not yet submitted a performance baseline for the BGRR D&D project for DOE-CH approval. Consequently, for evaluating this measure, the current TPC for the BGRR D&D is $43.3M.

4.3.2 Environmental Management Program Schedule Performance.

The weight of this Measure is 30%.

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[1] Total Project Costs for BNL is currently $329.4M (09/01/99). This amount represents the currently approved baseline estimated, including prior year costs (pre-FY 1999) of $133M. TPC is further defined as:

TPC = Project Baseline Costs + Contingency

[2] All BCPs submitted by BSA for consideration must meet a set of quality criteria, as specified in separate memorandum. Additionally, DOE must disposition all BCPs within 30 days of receiving a quality BCP from the Laboratory. The Laboratory will automatically receive credit for any proposed TPC reductions not properly dispositioned by DOE within this timeframe.

Achieve or accelerate specific milestones in accordance with approved program baselines. Contractor and its employees value commitments and demonstrate clear ownership for achieving results through clear leadership, early identification of problem areas, and application of effective corrective measures. Early schedule completions are desired which do not result in negative impacts to overall program costs or schedules.

Performance Measure:
Assessment of schedule performance against baseline target dates. Contract Critical Milestones are key to achieving overall EM mission success. These milestones are negotiated between DOE and the contractor annually from the existing program baselines. Evaluating actual completion dates against baseline dates assesses contractor performance for this measure. Completion criteria for each milestone have been included within the list of FY2000 Contract Critical EM Milestones (Enclosure A) to facilitate a common understanding between DOE and BSA.

Performance is assessed against the ratings and metrics shown in below:

Measure for EM Schedule Performance.

Performance Level	Performance Metrics
Outstanding	BSA achieves 100% of all FY 2000 Contract Critical Milestones within schedule and accelerates 5 FY 2001 milestones
Excellent	BSA achieves 100% of all FY 2000 Contract Critical Milestones within schedule and accelerates 3 FY 2001 milestones
Good	BSA achieves 100% of all FY 2000 Contract Critical Milestones within schedule
Unsatisfactory	BSA achieves less than 100% of all FY 2000 Contract Critical Milestones within schedule

Assumptions:

- All FY 2000 Contract Critical Milestones reflect currently approved baseline targets. (NOTE: DOE anticipates receiving and approving a BCP shortly after the beginning of FY 2000 to recognize the integration of BGRR into the site's program baseline as well as the acceptance of the FY 2000 CYWP. The enclosed milestones support the intent of the anticipated BCP. As DOE-CH approves BCPs, these milestone dates will be adjusted accordingly for purposes of evaluating performance.
- BSA may request schedule extensions with documented justification. DOE will give reasonable consideration to such requests and has the authority to grant or reject them.
- Finally, BSA may propose to substitute FY 2000 and FY 2001 milestones. DOE will give reasonable consideration to such requests and has the authority to grant or reject them.

In addition, nine post-FY-2000 Acceleration Milestones are identified in Enclosure B. Acceleration and completion of post-FY 2000 milestones during FY 2000 will allow the Contractor to achieve an "**Outstanding**" or "**Excellent**" rating. Additionally, such milestones accelerated and completed can also be substituted by the Contractor for missed FY 2000 milestones in a "two for one" ratio with the exception of DOE-signed Record of Decision (ROD) submittals for Operable Unites V and VI.

4.3.3 Effective and Efficient Waste Management.

The weight of this Measure is 25%.

Ensure that wastes derived from current Laboratory activities are managed properly to ensure regulatory compliance and cost efficiency. Laboratory institutionalizes processes which estimate planned waste generation, consider waste reduction options, formulate cost effective treatment/disposition approaches, and confirm available funding prior to the initiation of the activity of the waste producing activity. The contractor does not generate any waste that can not be properly disposed of within 12 months.

Performance Measure:
BSA dispositions all waste within 12 months of acceptance by the Laboratory's Waste Management Division and as recorded in the BSA waste tracking database. Tracking and trending of this metric will be based upon a 12-month rolling calendar of waste receipt, as reported in this database. FY 2000 performance levels and metrics for "Current Waste Management" activities are as follows:

Performance Level	Performance Metric
Outstanding	Lab disposes of 100% of each waste stream within 12 months and volumes reduces more than 85% LLW compactable solids
Excellent	Lab disposes of 100% of each waste stream within 12 months and volumes reduces more than 80% LLW compactable solids
Good	Lab disposes of 100% of each waste stream within 12 months and volumes reduces more than 70% LLW compactable solids
Marginal	Lab disposes of 100% of each waste stream disposed of within 12 months and volumes reduces less than 70% LLW compactable solids
Unsatisfactory	Lab disposes of less than 100% of each waste stream within 12 months and/or volumes reduces less than 70% LLW compactable solids

Assumptions:

- New waste streams generated after 9/30/99 without a disposition pathway will be tracked and reported for FY 2000. Waste streams generated after 7/09/00 without a planned disposition pathway or a DOE approved exception through an implementation of a DOE O 435.1 corrective action plan will automatically result in a "**Marginal**" or "**Unsatisfactory**" rating for this measure.
- On 9/30/99, a list will be submitted to BHG of any inventory > 12 months old. All waste >12 months old having disposition pathways shall be properly dispositioned in FY 2000. If this waste is not properly dispositioned or a DOE exception has not been approved BSA will automatically receive a "**Marginal**" or "**Unsatisfactory**" rating for this measure. BSA could request an exception in the case of an unforeseen or unintentional generation of waste (e.g. that involving a spill or accidental release). Also any situation that would constitute a Force Majeure which prevents BSA from dispositioning its waste in accordance with the metrics stated above would be grounds for requesting an exception from DOE. An example of such a situation would be the closure of an existing disposal site (e.g. Envirocare or Hanford) for reasons that were outside BSA's control. DOE will give every consideration to approve such a request or provide written documentation, which explains its denial.
- Waste at the HWMF or transferred from the HWMF is considered "legacy" and will not be considered within this measure.

4.3.4 Disposition of Site-Wide Excess Materials.

The weight of this Measure is 5%.

Excess Material inventories are completely identified, characterization plans are approved, treatment/disposal options are considered, priorities are established, funding is allocated, and inventories are reduced or eliminated. Contractor and its employees display ownership and leadership toward eliminating excess materials at the site. Contractor is a driving force and a willing partner in resolving funding matters with DOE.

Performance Measure:
Contractor reduces or eliminates high priority excess materials inventories during FY 2000. For purposes of this measure "reduction" is recognized to include the reuse, recycle, or disposal of such materials. Waste inventories on 09/30/99 are compared to inventories on 09/30/00. Performance is assessed against the target reductions shown immediately below:

Site Wide Excess Material Disposition Goals.

Excess Material Inventories	**Targeted Reductions**
Lead Brick / Shielding	100 tons
Elimination of excess chemicals	1,000 gallons
Scrap Steel: Scrap Aluminum: Scrap Copper:	100 tons 20 tons 10 tons

Assumptions:

- DOE recognizes that the funding to support the disposition of excess materials has historically been scarce.
- To further promote DOE's environmental stewardship at the BNL site, the Environmental Management program authorizes that up to 50% of all annual cost savings generated by BSA in redefining the EM clean-up program may be applied to the disposition of excess materials. Such expenditure of EM funds shall only be available in a matching manner with funds identified by BSA from indirect cost allocations (i.e. BNL site risk prioritization system).

$$\text{Target Reduction Ratio} = \frac{\text{Actual Reduction}}{\text{Target Reduction}} \times 100$$

Performance Level	Target Reduction Ratio
Outstanding	Greater than 105%
Excellent	95 – 105 %
Good	85 – 95%
Marginal	75 – 85%
Unsatisfactory	Less than 75%

Note: BSA's performance rating is based upon a ratio for each excess item, which recognizes actual results in comparison to targeted results, as shown above. An overall weighted ratio for the entire measure will be computed using weights of Lead (35%), Chemicals (35%), and Scrap (30%) multiplied by the reduction ratio of the individual excess material categories.

4.4 Business Operations

BNL will conduct its business operations with distinction, fully integrated with and supportive of the science, technology and cleanup missions, while being fully responsive to the business management needs and expectations of DOE.

The weight of this Objective is 20% of total.

4.4.1 Business Management/Information Systems

Improve enterprise-wide business management systems in support of world-class research at Brookhaven National Laboratory to provide consistent, cost-effective, and efficient means of managing the business functions of the Laboratory and provide records of the Laboratory's business/financial transactions for use as a basis for decisions regarding the improvement and enhancement of business operations.

The weight of this Measure is 25%.

Measure: Install Enterprise Resource Planning (ERP) System (PeopleSoft)

1. **Accounts Receivable** – This module is utilized to generate monthly billings, age receivables, provide information to facilitate collections, smoothly integrate with the General Ledger/Project Costing Modules, and provide greater flexibility to comply with DOE and other funding agency (e.g. NRC) reporting requirements. The legacy Accounts Receivable does not meet the Laboratory's current or projected needs.

   The milestone dates for this module are as follows:
   New system implementation - **October 1999** for the start of the new fiscal year.
   Initiate a feedback/change control process to further enhance effectiveness and meet customer needs – **January 2000**.

2. **Guest Tracking** - Capture and track Guest and Users for major facilities (RHIC, AGS, etc.) Scheduled implementation date - **January 2000**. Initiate a feedback/change control process to further enhance effectiveness and meet customer needs – **April 2000**

3. **Inventory** – The current Inventory system is outdated and like other parts of BNL's legacy **2000.** Initiate a feedback/change control process to further enhance effectiveness and meet system IPAP, in need of upgrading. The planned implementation date is scheduled for **April** customer needs – **June 2000.**

4. **HR** - The current HR system is a modified vendor software package no longer supported. By proceeding with the Guest Tracking module, the HR application can be scheduled to coincide with the beginning of the Benefits and Payroll parallel test period. This application's planned implementation date is **July 2000**. Initiate a feedback/change control process to further enhance effectiveness and meet customer needs – **September 2000**.

Metric: The FY00 deliverables focus on developing and implementing the above modules as well as initiating a feedback/change control process to further enhance their effectiveness and meet customer needs. Meeting the project milestones above will be considered Excellent performance, and bettering a milestone by 30 days or more will compromise Outstanding performance for that milestone. Missing a milestone by up to 45 days will be considered Good performance for that milestone, but only if the critical path is not adversely affected. Missing a milestone by more than 45 days will be considered Marginal performance for that milestone and by more than 90 days will be considered Unsatisfactory performance for that milestone.

Each milestone will be awarded points as follows based on accomplishment of that milestone:

Outstanding – 4 points
Excellent – 3 points
Good – 2 points
Marginal – 1 point
Unsatisfactory – 0 points

The evaluation of the Performance Measure will be the numerical average of the scores of the supporting milestones.

4.4.2 Process Improvement/Reengineering

Identify and review key business processes to provide improved customer service in support of the Laborato mission, minimize administrative time and cost and ensure prime contract compliance.

The weight of this Measure is 10%.

Contract Administration:

Improve the Lab-wide contract administration to improve subcontractor performance, and decrease Laboratory risk. Additionally, help ensure that performance and schedule requirements are met and payments are made in accordance with each contract's terms and conditions.

Scoring for this Measure: Total = .5(4.4.2.1) + .5(4.4.2.2)

4.4.2.1 Measure: Define and implement a policy, which ensures that technical representatives on contracts have properly defined scopes of authority and accountability and are appropriately trained – 09/30/00.

4.4.2.2 Measure: Define and implement a policy which includes DCP buyer/Contract specialist involvement in the contract administration process – 09/30/00.

Metrics
Outstanding – Accomplished by 06/30/00
Excellent – Accomplished by 07/31/00

Good – Accomplished by 09/30/00
Unsatisfactory – Failure to meet 09/30/00

BHG must agree on the effectiveness of these policies for BNL to receive credit.

4.4.3 Business Infrastructure Objectives

The weight of the Measure is 30%.

Metric for all of the following measures is as follows:

The FY00 ITD deliverables largely focus on developing the institutional-level operating infrastructure needed to underpin an excellent business/information technology infrastructure. Meeting the project milestones above will be considered Excellent performance, and bettering a milestone by 30 days or more will comprise Outstanding performance for that milestone. Missing a milestone by 45 days will be considered Good performance for that milestone, but only if the critical path is not adversely affected. Missing a milestone by 45 days will be considered Marginal performance for that milestone, and by more than 90 days will be considered Unsatisfactory performance for that milestone.

Each milestone will be awarded points as follows based on the accomplishment of that milestone:

Outstanding – 4 points
Excellent – 3 points
Good – 2 points
Marginal – 1 points
Unsatisfactory – 0 points

The evaluation of the Performance Measure will be the numerical average of the scores of the supporting milestones.

4.4.3.1 Establish a scientific computing infrastructure that is fully supportive of Brookhaven's scientific mission.

The weight of this element is 50%.

Provide state-of-the-art scientific computing hardware and software to BNL User community.

Performiance Measure Milestones
1. Quantify unmet needs by 1/31/00.
2. Research the field for appropriate products by 3/31/00.
3. Develop proposal by 5/31/00.
4. Acquisition cycle resulting in delivery/acceptance by 9/31/00.

4.4.3.2 Significantly Upgrade the Business Infrastructure to ensure effective information sharing and communications.

The weight of this element is 50%.

Identify the best source for each IT service in terms of efficiency quality, customer satisfaction, and cost-effectiveness.

Performance Measure Milestones

1. Establish service model and specifications by 10/31/99.
2. Quantify phase 1 transition, consisting of administrative unit desktops by 11/30/99.
3. Investigate outsource and in-house solutions, compare, and select by 2/28/00.
4. Commence phase 2 transition, including scientific unit desktops by 5/31/00.

4.4.4 Computer Security

Provide a computing and communications environment that is secure, yet open for interaction to effectively conduct the Laboratory's business and science.

The weight of this Measure is 35%.

Establish a comprehensive Computer Security program in line with DOE directives and guidelines.

Performance Measure Milestones

1. Perform a vulnerability assessment by 10/31/99
2. Identify the tools and techniques that will address security deficiencies in a systematic way by 11/30/99.
3. End of year for implementing #2.
4. Establish a program for performing ongoing reviews of security incursions and acceptable use by 3/31/00

Enclosure A
FY 2000 Critical EM Milestones

Brookhaven Graphite Research Reactor Decommissioning Project:

WBS: 17.7.2.01.1.3
Title: Complete Removal of the Pile Fan Sump (Area of Concern 9D) to DOE
Date Due: 3/31/2000
Type: IAG Primary Milestone, Facility Completion
Completion Criteria: Complete the removal of the Pile Fan Sump (PFS) and submit the draft Completion Report to DOE for submittal to EPA and NYSDEC for review. This report will have been previously reviewed by DOE and will incorporate resolution of comments as agreed to by the DOE BGRR-DP Project Manager. The draft Completion Report will include all final verification sampling results and recommendations for addressing any residual soil contamination related to the PFS that was not addressed by the removal action.

WBS: 17.7.2.01.1.2
Title: Complete Removal of the Fans from the Fan House
Date Due: 01/30/2000
Type: DOE-BGRR-PO Control Level (2b)
Completion Criteria: Complete the removal of the fans from the fan house and submit the Draft Closeout Report to DOE for review and approval. This report will have been previously reviewed by DOE and will incorporate resolution of comments as agreed to by the DOE BGRR-DP Project Manager. The draft Completion Report will include all final verification sampling results and recommendations for addressing any residual soil contamination related to the PFS that was not addressed by the removal action. Due consideration will be made to recycle and reuse of the metal material in the fans.

WBS: 17.7.2.01.6.1
Title: Issue the Draft Final Removal Action Alternatives Report to DOE
Date Due: 4/13/2000
Type:
Completion Criteria: Complete the Removal Action Alternatives Report and Issue the Report to DOE for final review and approval. This report will have been previously reviewed by DOE and external stakeholders and will incorporate resolution of comments as agreed to by the DOE BGRR-DP Project Manager.

WBS: 17.7.2.01.1.4
Title: Submit Draft Completion Report for Above Grade Duct Removal Action to DOE for EPA/DEC review
Date Due: 9/28/2000
Type:
Completion Criteria: Complete the Above Grade Duct Removal Action and issue the Draft Completion Report to DOE for review and approval. The draft Completion Report will include all final verification sampling results and recommendations for addressing any residual soil contamination related to the Above Grade Duct that was not addressed by the removal action. . This report will have been previously reviewed by DOE and will incorporate resolution of comments as agreed to by the DOE BGRR-DP Project Manager.

Waste Management Program:

WBS:
Title: Complete Plan to Implement actions for DOE O 435.1
Due Date: 4/30/00
Type:
Completion Criteria: BNL will have submitted to BHG a plan which includes a description of DOE O 435.1 requirements, actions needed to come into compliance and schedule for completing those actions.

WBS:
Title: Complete final draft Transition Plan
Due Date: 6/30/00
Type:
Completion Criteria: BNL will have submitted to BHG a Transition Plan which describes how the Waste Management Program will operate under SC including changes in organization and funding strategies.

WBS:
Title: Complete draft changes to 5820.2a based procedures.
Due Date: 9/28/00
Type:
Completion Criteria: BNL will submit to BHG a letter notifying that the existing procedures have been modified to address the new requirements in DOE O 435.1 and provide a copy of the modified procedures.

Remedial Activities:

WBS: 17.7.1.01.2.2
Title: Submit Draft Operable Unit I Remedial Design Work Plan to DOE for EPA/DEC review
Due Date: 7/17/00
Type: IAG Primary Milestone
Completion Criteria: This milestone will be satisfied by submittal of the draft Remedial Design Work Plan to the EPA and NYSDEC for review by the DOE Brookhaven Group. This Work Plan will be complete, meet EPA and State guidance and also meet the following conditions. This draft Work Plan will contain specific design activities that focus on minimization the amount of soil excavated and ultimately for off-site disposal and a cost effective program for any needed characterization and sampling (including post remediation verification sampling). An internal draft of this Work Plan will have already been provided to DOE for review and comment resolution in sufficient time to meet this milestone. All DOE comments provided on the initial draft will be satisfactorily addressed prior to BNL submittal of the regulatory review copy. It is DOE's expectation that BNL will aggressively facilitate and pursue the timely receipt and resolution of DOE and regulator concerns and feedback on the design of the remediation approach to Operable Unit I prior to submittal of this draft Work Plan. It is also DOE expectation that these comments and concerns will already be incorporated into the draft Work Plan. Note: This is an IAG primary milestone which is not currently scheduled with EPA and NYSDEC. The date is subject to change based on EPA/NYSDEC approval of the final date.

WBS: Not available
Title: Submit revised DOE-signed Operable Unit VI Record of Decision to EPA
Due Date: 1/12/00
Type: New milestone
Completion Criteria: This milestone will be satisfied with by submittal of the DOE-signed Record of Decision (ROD) to the EPA for signature. It is DOE's expectation that BNL will work aggressively to facilitate resolution of EPA comments on the December 1997 version of the Operable Unit VI ROD and draft Long Term Monitoring Work Plan and other stakeholder's (i.e. NYSDEC and Suffolk County) concerns in order to meet this milestone. Examples of activities that fulfill this expectation include prompt resolution of regulator comments, timely production of high quality documents and reports that are accurate easy to understand and review and that address stakeholder concerns; and scheduling meetings, presentations, briefings, teleconferences, etc. to facilitate resolution of regulator concerns.

WBS: 17.7.1.01.3.1.3
Title: Complete Bld. 811 UST Removal
Due Date: 5/12/00
Type: IAG Secondary Document, Release Site Completion
Completion Criteria: Complete the Building 811 UST Removal Action and submit the Draft Closeout Report to DOE for submittal to the EPA and NYSDEC for review and approval. The draft Closeout Report will be complete and will include all final verification sampling results and recommendations for addressing any residual soil contamination related to the USTs that was not addressed by the removal action.

WBS: 17.7.1.01.3.1.3
Title: Complete Disposal of Stockpiles 6B, 10, 12 and 13 at the Chemical Holes Bldg. 811
Due Date: Type:
Completion Criteria: This milestone will be satisfied when off-site disposal of Stockpiles 6B, 10, 12 and 13 at the Chemical Holes has been completed. BNL will provide written confirmation to DOE Brookhaven when this is accomplished.

WBS: 17.7.1.03
Title: Submit Draft Operable Unit III Remedial Design Work Plan to DOE for EPA/DEC review
Due Date: 1/24/2000
Type: IAG Primary Milestone
Completion Criteria: This milestone will be satisfied by submittal of the draft Remedial Design Work Plan to the EPA and NYSDEC for review by the DOE Brookhaven Group. This Work Plan will be complete, meet EPA and State guidance and also meet the following conditions. This draft Work Plan will contain specific design activities that focus on a comprehensive remediation approach that integrates the various groundwater treatment systems to be designed/constructed. An internal draft of this Work Plan will have already been provided to DOE for review and comment resolution in sufficient time to meet this milestone. All DOE comments provided on the initial draft will be satisfactorily addressed prior to BNL submittal of the regulatory review copy. It is DOE's expectation that BNL will aggressively facilitate and pursue the timely receipt and resolution of DOE and regulator concerns and feedback on the design of the remediation approach prior to submittal of this draft Work Plan. It is also DOE expectation that these comments and concerns will already be incorporated into the draft Work Plan. Note: This is an IAG primary milestone which is not currently scheduled with EPA and NYSDEC. The date is subject to change based on EPA/NYSDEC approval of the final date.

WBS: 17.7.1.03.3.13
Title: Submit 90 % Design for Middle Road Groundwater Treatment System to DOE
Due Date: 5/12/00
Type: IAG Secondary Document
Completion Criteria: This milestone will be satisfied by submittal of the draft 90 percent design for the Middle Road Treatment system to DOE for submittal to the EPA and NYSDEC for review. This design will meet the following conditions: This draft design will be complete and meet EPA and State requirements. DOE review of the internal draft 90 percent design will have been addressed. EPA and NYSDEC comments on the 30% design will have been addressed to their satisfaction and formal responses to comments will have been provided.

WBS: 17.7.1.03.13
Title: Complete Construction – Bldg. 96 Groundwater Treatment System
Due Date: 5/24/00
Type:
Completion Criteria: This milestone will be satisfied when construction of the Bldg. 96 Groundwater Treatment System is complete. BNL will provide written confirmation to DOE Brookhaven Group when this is accomplished.

WBS: 17.7.1.05.1.4.3.2
Title: Submit DOE Signed Operable Unit V ROD with Responsiveness Summary to EPA
Due Date: 10/30/99
Type: IAG Primary Milestone
Completion Criteria: This milestone will be satisfied with by submittal of the DOE-signed Record of Decision (ROD) to the EPA for final signature. It is DOE's expectation that BNL will aggressively facilitate and pursue timely receipt and resolution of DOE and stakeholder (including regulators) concerns and comments on the draft ROD and supporting documentation in order to meet this milestone. All needed New York State reviews will have been completed and State concurrence obtained on this ROD. Examples of activities that fulfill this expectation include sufficient scoping to ensure that DOE and stakeholder concerns are well understood; production of high quality documents, reports and public participation materials that are accurate easy to understand and review and that incorporate stakeholder concerns; and scheduling meetings, presentations, briefings, teleconferences, etc. when needed to facilitate reviews and obtain more timely feedback.

WBS: 17.7.1.05.1.4.3.2
Title: Submit Draft Operable Unit V Remedial Design Work Plan to DOE for EPA/DEC review
Due Date: 11/19/99
Type: IAG Primary Milestone
Completion Criteria: This milestone will be satisfied by submittal of the draft Remedial Design Work Plan to the U.S. EPA and NYSDEC for review by the DOE Brookhaven Group that meets the following conditions. This draft Work Plan will be complete, meet EPA and State requirements and contain specific design activities that focus on limiting excavation of sediments in the Peconic River and minimizing the cost of waste disposal. An internal draft of this Work Plan will have already been provided to DOE for review and comment resolution in sufficient time to meet the 11/19/99 milestone. All DOE comments provided on the initial draft will be satisfactorily addressed prior to BNL submittal of the regulatory review copy. It is DOE's expectation that BNL will aggressively facilitate and pursue the timely receipt and resolution of DOE and regulator concerns and comments on the design of the remediation approach to Operable Unit V prior to submittal of this draft Work Plan. It is also DOE expectation that these comments and concerns will already be incorporated into the draft Work Plan. . Note: This is an IAG primary milestone which is not currently scheduled with EPA and NYSDEC. The date is subject to change based on EPA/NYSDEC approval of the final date.

WBS: 17.7.1.09.1.3.04
Title: Submit Draft Calendar Year 1999 Groundwater Monitoring Report to DOE for review
Due Date: 06/15/00
Type:
Completion Criteria: This milestone will be satisfied by submittal of the draft Calendar Year Groundwater Monitoring Report is submitted to DOE for review. This report will be complete, contain all final and validated data planned for the entire BNL monitoring program (i.e. both environmental restoration and facility monitoring), evaluate data trends and make recommendations on any needed changes to the future groundwater monitoring.

Boneyard Waste Project:

WBS: 17.7.4.2
Title: Award Issue Contract for Large-Scale Procurement for Boneyard Wastes
Due Date: 6/10/2000
Type:
Completion Criteria: This milestone will be satisfied by the award (i.e. signature by both BNL and subcontractor) of a contract for a Large-Scale Procurement for treatment, transportation and disposal of the remaining wastes in the Boneyard Waste Project.

WBS: 17.7.4.2.03
Title: Complete Shipment of Resins and Copper
Due Date: 9/30/00
Type:
Completion Criteria: This milestone will be completed when the Resins and Copper are shipped off-site for final treatment and disposal. BNL will provide written confirmation to DOE Brookhaven when this is accomplished.

WBS: 17.7.4.0.05
Title: Complete Shipment of Major Metal Pieces
Due Date: 9/30/00
Type:
Completion Criteria: This milestone will be completed when the Major Metal Pieces are shipped off-site for final disposal. BNL will provide written confirmation to DOE Brookhaven Group when this occurs.

WBS: 17.7.4.2.06
Title: Complete Shipment of Steel
Due Date: 9/30/00
Type:

Completion Criteria: This milestone will be completed when the Steel are shipped off-site for final disposal. BNL will provide written confirmation to DOE Brookhaven Group when this occurs.

Technology Deployment and Development:

WBS:
Title: Complete Two new EM-50 Technology Deployments
Due Date: 9/30/00
Type:
Completion Criteria: This milestone will be satisfied by the deployment of two EM-50 developed technologies at BNL (or on BNL problems) by 9/30/00. Current candidates are the viscous liquid barrier demonstration, the Segmented Gate System and the SPSS deployment using Chemical Holes Soils to Envirocare. Technologies that are to be deployed as part of the two existing BNL ASTD projects are not allowed for this milestone.

Enclosure B

Post-FY 2000 Acceleration Milestones

WBS: 17.7.1.01.2.2
Title: Submit final Operable Unit I Soils Design to DOE (for submittal to EPA/DEC)
Due Date: 3/6/01
Type: IAG
Completion Criteria: : This milestone will be satisfied by submittal of the final Operable Unit I Design for Radiologically Contaminated Soils to the EPA and NYSDEC for review by the DOE Brookhaven Group. This Design will be complete, meet EPA and State guidance and also meet the following conditions. This Design will contain specific activities that focus on minimization the amount of soil excavated and ultimately for off-site disposal and a cost effective program for any needed characterization and sampling (including post remediation verification sampling). An internal draft of this final Design will have already been provided to DOE for review and comment resolution in sufficient time to meet this milestone. All DOE comments provided on the initial draft will be satisfactorily addressed prior to BNL submittal of the regulatory review copy. All regulatory agency (EPA, NYSDEC and SCDHS) comments provided on the draft 30 percent design will be incorporated into this design to their satisfaction and responses to comments will have been provided. It is DOE's expectation that BNL will aggressively pursue and resolve DOE and regulatory agency comments on the 30 percent design prior to submittal of the version of the Design. Note: This is an IAG primary milestone which is not currently scheduled with EPA and NYSDEC. The date is subject to change based on EPA/NYSDEC approval of the final date.

WBS: 17.7.1.01.3.4 (O10358)
Title: Submit (draft) HWMF Completion Report to DOE (for submittal to EPA/DEC)
Due Date: 3/19/01
Type:
Completion Criteria: This milestone will be satisfied by submittal of the Draft Completion Report for the D&D of the former HWMF to EPA/DEC by the DOE Brookhaven Group for concurrent DOE/EPA/DEC review. This draft Completion Report will be complete and will contain all required final verification sampling results and planned disposal pathways for the wastes generated during the D&D. Included will be a discussion of proposed activities that focus on cost effective waste minimization.

WBS: 17.7.1.03.3.11 (03M0545)
Title: Initiate Middle Road Treatment System Startup Testing
Due Date: 2/21/01
Type:
Completion Criteria: This milestone will be satisfied when construction of the Middle Road System is completed and the system is turned on for the initiation of startup testing.

WBS: 17.7.1.03.3.02
Title: Submit 30 % Design for Airport System to DOE
Due Date: 12/20/00
Type: IAG Secondary Document
Completion Criteria: This milestone will be satisfied by submittal of the draft 30 percent design for the Airport to DOE for review. This design will meet the following conditions: This draft design will be complete and meet EPA and State requirements.

WBS: 17.7.1.03.3.12 (O3N0460)
Title: Submit 30% Design on North Street System to DOE
Due Date: 12/31/01
Type: IAG Secondary Milestone
Completion Criteria: This milestone will be satisfied by submittal of the draft 30 percent design for the North Street Treatment system to DOE for submittal to the EPA and NYSDEC for review. This design will meet the

following conditions: This draft design will be complete and meet EPA and State requirements. DOE review of the internal draft 30 percent design will have been addressed.

WBS: 17.7.1.08.5.02 (RM0386G)
Title: Initiate Preliminary Testing (Startup) at North Street East System
Due Date: 1/29/01
Type:
Completion Criteria: This milestone will be satisfied when construction of the North Street East System is completed and the system is turned on for the initiation of startup testing.

WBS: 17.7.1.05.3 (O50363)
Title: Submit OU V (draft) RA Work Plan to DOE (for submittal to EPA/DEC)
Due Date: 6/10/02
Type: IAG Primary Milestone
Completion Criteria: This milestone will be satisfied by submittal of a draft Remedial Action Work Plan to the U.S. EPA and NYSDEC for review by the DOE Brookhaven Group that meets the following conditions. This draft Work Plan will be complete, contain the final Design, meet EPA and State requirements and contain specific activities that focus on limiting excavation of sediments in the Peconic River and minimizing the cost of waste disposal. An internal draft of this Work Plan will have already been provided to DOE for review and comment resolution in sufficient time to meet this milestone. All DOE comments provided on the initial draft will be satisfactorily addressed prior to BNL submittal of the regulatory review copy. It is DOE's expectation that BNL will aggressively facilitate and pursue the timely receipt and resolution of DOE and regulator concerns and comments on the design and remediation approach to Operable Unit V prior to submittal of this draft Work Plan. It is also DOE expectation that these comments and concerns will already be incorporated into the draft Work Plan. . Note: This is an IAG primary milestone which is not currently schedule with EPA and NYSDEC. The date is subject to change based on EPA/NYSDEC approval of the final date.

WBS: N/A
Title: Draft EE/CA for Canal House Removal to DOE
Due Date: 11/01/00
Type:
Completion Criteria: This milestone is satisfied by submittal of the draft EE/CA for the Canal House Removal to DOE for review.

WBS: N/A
Title: Draft Below Grade Piping and Soils Completion Report to DOE
Due Date: 11/01/00
Type:
Completion Criteria: This milestone is satisfied by completion the required activities for the Below Grade Piping and Soils and submittal of the draft Completion Report to DOE for review. The draft Completion Report will verify that all needed response actions have been completed and include all final verification sampling results.

Excellence Indicators for FY ES&H Off-ramp

As described in Article 12A, Off-ramp, the Contractor will be evaluated by DOE thirty-three months after the effective date in accordance with the following measures.

Measure 1: **Average Number of Facility Walk-throughs Per Senior Manager Per Year**

Objective: Accountability of managers for issue identification and resolution creating correlation between number of senior management walk-throughs and (1) improved awareness of ES&H conditions; (2) expanded training of senior managers in ES&H self-audit techniques; and (3) increased management involvement in assuring timely and appropriate remediation.

Requirements Basis: None

Data Source: Contractor records

Definitions: For the purposes of this indicator, a "senior manager" is the Laboratory, Deputy Director, Assistant and Associate Directors, Division Directors, and Facility or Project Managers. A walk-through is any facility or activity visit or tour made by a senior manager with the specific intent of monitoring or improving safety and/or quality performance.

Excellence Indicators:

FY99:	8/YEAR/SENIOR MANAGER AVERAGE
FY00:	12/YEAR/SENIOR MANAGER AVERAGE and NOT LESS THAN 6 PER MANAGER

Measure 2:	**Lost Workday Case Rate**
Objective:	Determine the overall effectiveness of DOE worker Occupational Safety and Health Programs
Requirement Basis:	DOE O 231.1
Data Source:	CAIRS
Definitions:	Number of lost workday cases in which the employee suffered a work related injury or illness that involves days away from work or days of restricted work activity, or both (Per 200,000 hours worked)
Excellence Indicators:	FY99: BELOW DOE AVERAGE FY00: BELOW DOE RESEARCH LABORATORY AVERAGE

Measure 3:	**Environmental Index**
Objective:	Reduction in site emissions by complying with all applicable environmental regulations and plans, implementing pollution prevention projects, conducting process waste assessments, and improving the way hazardous materials are handled.
Requirements Basis:	DOE O 232.1; Secretarial policy letter
Data Sources:	Site Environmental Report, NESHAPs Air Emissions Report, SARA Title III Reports, Storage Tank Inventory, Report on Waste Generation and Minimization, IAG Administrative Record.
Definition:	Index = sum of normalized weighted environmental emissions attributes (i.e., Sum (RV x NF x WF), where RV = raw value; NF = normalization factor; and WF = weighting factor.) Normalization factors established using FY95 data (see Environmental Index Baseline, attached) such that FY95 Environmental Index = 100.
Notes:	This measure was the 2X indicator for ES&H in the FY96 BHG Business Plan. The measure is a composite of important environmental attributes at BNL, which represent both controlled and uncontrolled emissions. Divisor assures that HFBR shutdown does not account for reduction.
Excellence Indicators:	

FY99: 25% REDUCTION FROM FY95 INDEX
FY00: 50% REDUCTION FROM FY95 INDEX

ENVIRONMENTAL INDEX – BASELINE

Environmental Attribute	1995 Raw Value	Normalization Factor	Weighting Factor	Index
		(1/Raw Value)		(RV x NF x WF)
1995 Max. Offsite Eff. Dose Equi. em)	0.38	2.63E+00	10	10
Tritium to Peconic River (mCi)	2713	3.69E-04	8	8
Tritium to Air Emissions (Ci)	104.8	9.54E-03	9	9
1995 Hazardous Waste Disposed	79	1.27E-02	6	6
1995 Radioactive Waste Disposed	15745	6.35E-05	6	6
1995 Mixed Waste Disposed	106	9.43E-03	6	6
1995 SARA Title III Emissions (lbs)	2484	4.03E-04	6	6
SPDES permit Excursions (#)	11	9.09E-02	8	8
Sub-standard Storage Tanks (# est.)	15	6.67E-02	10	10
Significant Spills (#>50 gal.)	3	3.33E-01	9	9
Restoration Remedies Selected (1/#)	0.2	5.00E+00	10	10
Paper Recycled (1/tons)	0.003627	2.76E+02	6	6
Solid (non-hazardous) Waste Generated (tons)	694	1.44E-03	6	6
			100	100
Operations Factor				1
Environmental Index				100
Data Source:				
1995 Site Environmental Report				
1995 Site Wide Air Emissions Report				
1995 SARA Title III Reports				
Storage Tank Inventory				
1995 Rpt. On Waste Gen. And Minimization				
IAG Administrative Record (RODs and Action Memoranda)				

OTHER CONTRACT EXPECTATIONS

Communications and Trust

National Recognition

The Laboratory shall generate in agreement with the DOE, national recognition for major BNL accomplishments during FY00. Reviewers shall evaluate the selection process, and the efficiency, effectiveness, and completeness of the coverage generated. The RHIC program will initially be the primary focus of this measure.

Ambassador Program

The Laboratory conducted four pilot programs as part of the Ambassador Program in FY99 in order to gain insight into what might be the most effective design for an ongoing program. The pilots were: a) a Science Fair Help Day, b) a public TV pledge drive, c) a beach cleanup project, and d) the preservation of an historic schoolhouse. For FY00 the Laboratory will direct its Ambassador efforts toward projects, which promote science education and provide opportunities for Laboratory employees to engage in community outreach and interact face-to-face with the public.

- Initiate Boy Scout Atomic Energy Merit Badge Program.

BNL is uniquely qualified to provide a safe and knowledgeable environment where all the elements of the Boy Scout Atomic Energy badge can be fulfilled. The program would identify and train five BNL employees as merit badge signers for the Boy Scouts of America. Volunteers will guide the scouts through the necessary steps to completing the Merit Badge and sign off on their completion.

- Introduce Radiation and You Program.

Radiation and You is a program which introduces the concept of radiation as an everyday part of our lives by looking at common natural and man-made sources of radiation. The ALARA concept is explained via the use of hands-on devices, e.g. the students use Geiger counters to measure radiation in every day items. The program will join BNL volunteer scientists with the educational community and students during visits to their schools. Each volunteer scientist will visit two schools a year for this person-to-person community interaction.

- Establish a BNL Scientist Help Line program.

This program will help place the expertise of highly qualified volunteer scientists at the disposal of the community at large. Ten volunteer scientists in different scientific departments will respond to science questions sent to a BNL e-mail address. The Ambassador Program coordinator will, in conjunction with the Office of Educational Programs, direct the question(s) to the appropriate volunteer scientist for a response. Checking the reply time will be the responsibility of the coordinator. The e-mail network will require the support of line management as well as volunteer researchers. The e-mail address will be made available to schools, libraries and newspapers and distributed in priority areas through mailings, a notice on the web site and various public media.

Envoy Program

The Envoy program has increased participation by nearly 100% during FY99 (total is now about 40). Many of the new Envoys were recruited during the summer and will receive initial training beginning in September. Their initial participation as Envoys will commence the beginning of FY00. Program enrichment, rather than pursuit of quantitative increases in the number of participants, will be the goal for FY00. The Laboratory will focus its resources on

careful nurturing of this rapidly expanded program and ramping up the qualitative contributions of participants.

Community Asset

The Laboratory will be recognized as a community asset by providing community educational programs for teachers and students and opportunities for the public to visit the Laboratory. A key element of this is the Laboratory's On-site Visitors Program. This program is designed to attract substantial numbers of participants from the educational, business and related sectors to visit BNL, tour and/or use various BNL facilities, and become comfortable and familiar with the capabilities, operations, and benefits afforded to the community by the Laboratory. Three very different and very large and/or significant programs will be reviewed as surrogates for the quality of the community asset initiative. These are: The Summer Sunday program, the Student Visitor program, and the Science Contests program.

- The Summer Sunday program is a public open-house-type program operated on eight successive weekends.
- The Student Visitor program measures educational usage (students and teachers) over the course of approximately 120 school days.
- The Science Fair program measures participation in an intense, one-day contest by highly motivated, science-oriented teams.

The FY00 attendance goal for these programs is a 10% increase in aggregate over that achieved in FY99.

The Laboratory will gather feedback from participants in these programs during FY00 and evaluate this data against similar feedback gathered in FY99. Reviewers will consider this feedback in evaluating the effectiveness and completeness of these programs.

Environment, Safety and Health Excellence

Occupational Safety and Health

BNL will seek to achieve excellence in worker safety and health protection.

In the area of Occupational Safety and Health BNL will seek to improve the following reportable rates:

Total Recordable Case Rate (OSHA Recordables) RCR
Lost Workday Case Rate (LWCR)
Days Away from Work Rate (DAWR)

Where:

$$\text{RCR per 100 FTEs} = \frac{\text{Number of OSHA reportable injuries/illnesses x 200,000}}{\text{Total Hours Worked}}$$

$$\text{LWCR per 100 FTEs} = \frac{\text{Number of Lost Workday Cases x 200,000}}{\text{Total Hours Worked}}$$

$$\text{DAWR per 100 FTEs} = \frac{\text{Actual Number of Days Away From Work x 200,000}}{\text{Total Hours Worked}}$$

The following Table reflects expectations in these areas.

	Outstanding	Excellent	Good	Marginal	Unsatisfactory
	<30% of	<15% to 30%	+/-15% of	>15% to 30%	>30% of Mean

	Mean	of Mean	Mean	of Mean	
RCR	<3.15	3.15 to 3.83	4.5 *	5.17 to 5.85	>5.85
DAWR	<26	26. to 31.54	37.1 **	42.66 to 48.2	>48.2
	<50% of Mean	25 to 50% of Mean	+/- 25% of Mean	>25-50% of Mean	>50% of Mean
LWCR ***	<1.45	1.45 to 2.18	2.9 *	3.62 to 4.35	>4.35

* Historical Averages 1993 – 1997 from the CAIRS Data Base (CY)

** Historical Average 1995 – 1998 from BNL Data (Not a CAIRS reportable item) (FY)

*** Percentages changed for LWCR to coincide with the established "off ramp" provisions in Appendix B.

In the area of Chemical Safety Performance BNL will seek to ensure that chemical containers are properly inventoried.

The approach used will be to:

- Survey all containers in five rooms – (Use lottery to select departments/divisions/rooms).
- Survey will be limited to rooms with more than 50 chemical containers. If the room contains more than 400 containers, the room will count as two rooms.
- BNL and BHG would jointly participate in the compilation and evaluation of this data and establishment of the performance metrics.
- The field verification would be unannounced

The following Table reflects expectation in this area where the composite score is determined by 70% of the percentage of containers with barcodes plus 30% of the percentage of bar coded containers assigned to the correct owners (current staff or visitors at the time of field verification).

Composite Score

Outstanding	> 0.9
Excellent	> 0.75 to 0.9
Good	> 0.65 to 0.75
Marginal	> 0.5 to 0.65
Unsatisfactory	=/< 0.5

Also in the area of chemical safety performance BNL will seek to minimize legacy chemical containers.

Measure:
The percentage of terminated or transferred staff with 100% disposition of assigned chemical containers within one month of termination or transfer date.

The approach used will be to:

- Measure the percentage of terminated or transferred staff with 100% disposition of assigned chemical containers within one month of termination or transfer date.
- All terminations during FY 2000 will be evaluated.

The following Table reflects expectations in this area.

Score

Outstanding	> 80 %
Excellent	65% to 79%
Good	45% to 64%
Marginal	30% to 44%
Unsatisfactory	< 30 %

Environmental Protection

Consistently meet all SPDES permit limits

BNL is committed to achieving full compliance with environmental requirements.

Compliance with SPDES discharge limits is important to stakeholders, as SPDES discharges can impact the Peconic and groundwater. Compliance depends upon the efforts of all organizations contributing to discharges through these outfalls. For monitoring Laboratory performance in this area the following process will be used:

Using the SPDES Discharge Monitoring Report results, the raw score for permit exceedances (for all parameters) that occurred during the previous calendar year will be determined. The "raw" score is determined using the algorithm shown below.

SPDES Permit performance expectations are:

1. Has a SPDES limit been exceeded?
   If no, assign a raw score value of 0.
2. If yes, is the exceedance significant?
   If no, assign a raw score value of 1.
3. If yes, has the exceedance occurred in two or more consecutive months?
   If no, assign a raw score value of 2.
4. If yes, has the exceedance occurred for more than one consecutive quarter?
   If no, assign a raw score value of 2 per month of violation then add 3 to the raw score total.
5. If yes, assign a raw score value of 2 per month of violation then add 10 to the raw score total.

Once the raw score has been determined, for each exceedance episode, determine the Quality Factor that will be used to adjust the raw score. The Quality Factor is used to rate the extent of the exceedance and is determined in accordance with the following table:

Quality Factor	Toxic Pollutants	pH	Non-Toxic Pollutant
1	1.0 – 1.5 x Limit	Within 1 SU of Limit	1.0 – 3 x Limit
3	1.5 – 3 x Limit	Within1.5 SU of Limit	3 – 5 x Limit
5	3 –5 x Limit	Within 2 SU of Limit	5 – 10 x Limit
10	5 – 10 x Limit	Greater than 2 SU from Limit	> 10 x Limit
20	> 10 x Limit	N/A	N/A

Multiply the Quality Factor by the raw score for each exceedance episode to determine the adjusted score.

Assumptions:

1. Determination of a Significant Exceedance
   Toxic Pollutants: Exceedance > 1.2 x Limit
   Non-Toxic Pollutants: Exceedance > 1.4 x Limit
   pH: > or < 1 SU from Limit
2. Toxic Pollutants include all metallic elements (including iron), volatile organic compounds, cyanide, and radiological contaminants.
3. Non-Toxic Pollutants include BOD, TSS, residual chlorine, ammonia nitrates/nitrites, and coliform.

The following Table reflects Expectations in this area.

Rating Levels	Performance (Adjusted Score)
Outstanding	0
Excellent	1-25
Good	26-45
Marginal	46-75
Unsatisfactory	> 75

In the area of environmental spills BNL is committed to strong spill prevention program and a timely, effective spill response program for preserving the quality of soils and groundwater at BNL.

To facilitate monitoring our performance in this area the total number of significant spills to the environment and the time necessary to remediate these releases to the satisfaction of NYSDEC will be weighed against 1995 baseline values (i.e.; 3 significant releases).

The following Table reflects expectations in this area.

Table 1
Significant Spills Performance Metric

Rank	Maximum Incident Rate	Remediation Conditions with Point Assignment	Total Score
Outstanding	0 incidents/year (16 points)	N/A	16
Excellent	1 incident/year (9 points)	Spill is cleaned up to the satisfaction of the NYSDEC within 30 days of the occurrence (3 points) and there are no impacts to groundwater (3 points)	12-15
Good	2 incidents/year (6 points)	Spill is cleaned up to the satisfaction of the NYSDEC within 60 days of the occurrence (2 points) and there are no impacts to groundwater (2 points)	8-11
Marginal	3 incidents/year (3 points)	Spill is cleaned up to the satisfaction of the NYSDEC more than 60 days after the occurrence (1 point) and there are no impacts to groundwater exceeding MCLs (1 point)	5-7
Unsatisfactory	>3 incidents/year or any spill with known impacts to groundwater which exceeds MCLs (0 points)	Spill is not cleaned up to the satisfaction of the NYSDEC (0 points)	0-4

Assumptions:

1. An "incident" is a significant spill. Spills are releases of liquids.
2. Spills of petroleum products greater than 42 gallons will be considered significant.
3. Any release of a hazardous material (excluding petroleum products) in quantities which exceed either of the following reportable quantities: RCRA, CERCLA, SARA, NYS Chemical Bulk Storage (6NYCRR Part 597) is considered significant.
4. If this release results in impact to groundwater above MCLs, then any quantity release is considered significant.
5. Spills completely contained within secondary containment systems will not be considered significant, regardless of quantity spilled.
6. Only spills associated with current operations will be considered under this measure (i.e., release occurs or is ongoing in FY '00). Historical spills discovered during remedial investigations, other clean up or construction operations will not be included in this metric.

In the area of Tritium releases to the Sewage Treatment Plant (STP Outfall) BNL has established a standard of performance that staff shall ensure that all environmental effluents, emissions and wastes associated with their work are as low as reasonably achievable. Tritium emissions/effluents have high visibility with stakeholders due to groundwater contamination resulting from past practices. The STP Outfall discharges directly to the Peconic River, and the Peconic recharges groundwater. The STP receives waste from the entire site.

STP discharge quality has been raised as an issue in the reactor restart decision. However, tritium discharge is not regulated in the SPDES permit. Note that the Drinking Water Standard for tritium is 20,000 pCi/L, and administrative approval authorization limits are already much lower than those specified in DOE Order 5400.5.

The goal of this measure is to eliminate tritium spikes at the Outfall, and to encourage implementation of pollution prevention opportunities to reduce batch releases to the STP. BNL's new E-ALARA decision process will be used to authorize releases.

The following Table reflects expectations in this area.

Rating Levels	Performance	Score
Outstanding	Monthly average < 5,000 pCi/L and Daily Composite < 5,000 pCi/L	4.0
Excellent	Monthly average < 10,000 pCi/L and Daily Composite < 10,000 pCi/L	3.0-3.9
Good	Monthly average < 10,000 pCi/L and Daily Composite < 20,000 pCi/L	2.0-2.9
Marginal	Monthly average < 10,000 pCi/L and Daily Composite = 20,000 pCi/L	1.0-1.9
Unsatisfactory	Monthly average > 10,000 pCi/L and Daily Composite > 20,000 pCi/L	<1.0

Calculate the score for each month. Then calculate the average annual score. The final rating level for this measure is based on the average annual score. Subtract 1.5 points from the total score for each daily composite >60,000 pCi/L (a spike of 3x the Drinking Water Standard).

Assumptions:
None.

In the area of waste reduction and resource conservation BNL is committed to achieve Contractual and Secretarial goals.

The following targets for routine waste generation measures were developed based on secretarial goals and the environmental index in the BSA contract.

50% reduction in Hazardous Waste
50% reduction in Mixed Waste
30% reduction in Radioactive Waste
25% improvement in Affirmative Procurement from FY97 Baseline (total dollars spent on designated items)

The following Table reflects expectations for this area.

Rating Level	Performance
Outstanding	All reduction goals achieved.
Excellent	Reduction goals achieved for three out of four categories
Good	Reduction goals achieved for two categories
Marginal	Reduction goals achieved for one category
Unsatisfactory	None of the reduction goals achieved.

Assumptions:

1. FY95 is the baseline year, unless otherwise noted.
2. All numbers are Fiscal Year.
3. Only waste from "routine" operations is tracked for this purpose. Construction/demolition wastes, restoration wastes, newly identified wastes, legacy wastes, legacy/newly identified spills, PCB waste, lead painted debris, lead shielding, and other wastes determined to be "non-routine," with concurrence by DOE, shall not be included.
4. Solid Waste Diversion rate is calculated as Solid Waste Diversion Rate = (R/(R+L)) * 100, where R= the amount of sanitary waste that is composted, mulched, recycled, reused, and donated, and L= the amount of sanitary waste transferred to a landfill.
5. Source of data is WMD database (hazardous, radioactive, and mixed waste goals), Plant Engineering Recycling Program (Solid waste diversion goal), and Annual Report of Waste Generation and Pollution Prevention Progress (Affirmative Procurement goal).
6. Sufficient funds will be available for performance of Pollution Prevention Opportunity Assessments and implementation of feasible options.
7. Any actual or anticipated change in workload or operations will be brought to the attention of DOE as soon as possible, and appropriate changes will be made to the goals. These changes (e.g., lab-wide changeout of PCB ballasts) can be incorporated via the operations factor used in the Environmental Index.

Pollution Prevention/Waste Minimization

The Laboratory is committed to improving its Pollution Prevention/Waste Minimization Program.

Pollution prevention includes source reduction, substitution of less or non-hazardous chemicals for hazardous ones, reuse and recycling. Strengthening the Pollution Prevention program at BNL is a high priority on the ESD improvement agenda, and was identified as an area needing improvement in the EH Audit. In targeting waste streams for pollution prevention/waste minimization, emphasis should be placed on opportunities identified in the Phase II Process Evaluation Process, waste streams of primary concern to stakeholders, and waste streams where reductions are needed to meet secretarial or contractual goals. The Environmental Compliance and Waste Management Representatives will team with Dept. staff to provide technical assistance for the Pollution Prevention program, which will be implemented via assessments of pollution prevention opportunities as described above, and as part of the Experimental Review, Facility Design Review and Tier 1 processes.

Expectations:

1. Form a Pollution Prevention Council with Lab-wide representation to broaden awareness and ownership by 12/15/99. A charter will be developed. One of their tasks will be to develop an improved system to capture and track costs avoided/saved as a result of implementation of pollution prevention/waste minimization opportunities.
2. By 09/30/00, conduct assessments of pollution prevention opportunities to evaluate the technical and economic feasibility of implementing opportunities identified during the Phase II Process Evaluations that were completed and documented by the end of FY 99. Priority routine waste streams/emissions/effluents will be identified. At least one assessment will be conducted for each Department that has a distributed waste minimization goal and the expectation is that at least one pollution prevention opportunity will be implemented for each such Department. An effort will be made to identify key waste streams in each of the following categories: Hazardous Waste, Radioactive Waste, Mixed Waste, and Solid Waste. Selection criteria will also include amount of waste generated, toxicity, and likelihood of success.

Scoring:

Rating Levels	Performance
Outstanding	Acceptable quality and ahead of schedule
Excellent	Acceptable quality and within milestone
Good	Acceptable quality and minor schedule variance
Marginal	Marginal quality or significant schedule variance.
Unsatisfactory	Marginal quality and significant schedule variance.

Assumptions:
Sufficient funds will be available for performance of pollution prevention opportunity assessments and implementation of feasible options. (Note: DOE-EM (HQ) has indicated that funding provided previously will not be allocated in FY 00).

Radiological Control

BNL will seek to achieve operational excellence in radiological control

In regard to AGS Collective Dose the following Table reflects expectations consistent with the goals as generated by the AGS ALARA Committee.

Performance Rating Levels:

Rating Level	Performance
Outstanding	Under-running ALARA Goal by 20%
Excellent	Under-running ALARA Goal by 10%
Good	Meeting ALARA Goal
Marginal	Exceeding ALARA Goal 20%
Unsatisfactory	Exceeding ALARA Goal 40%

In regard to Radioactive Contaminations BNL will monitor the numerical count of the number of events (not individuals) of external personnel contamination that meet ORPS reportable criteria.

The following Table reflects expectations in this area.

Performance Rating Levels:

Rating Level	Performance
Outstanding	4 or less
Excellent	5-8
Good	9-12
Marginal	13-16
Unsatisfactory	>17

Note: Performance may be changed to rate of events versus Radiation Work Permit entry time after sufficient data is available.

In regard to internal uptakes BNL will seek to reduce the numerical count of internal uptakes including tritium in excess of 100 mrem from planned operations.

The following Table reflects expectations in this area.

Rating Level	Performance
Outstanding	0 events
Excellent	2 events
Good	3 events
Marginal	4 events
Unsatisfactory	5 events

In regard to unplanned dose BNL will seek to reduce the numerical count of events (not individuals) that either result in an unplanned dose exceeding (internal or external dose) the expected dose by 100 mrem or result in an unplanned dose exceeding Administrative Control Levels (ACL).

The following Table reflects expectations in this area.

Rating Level	Performance
Outstanding	0 events
Excellent	2 events
Good	3 events
Marginal	4 events
Unsatisfactory	5 events

In regard to the Radiological Control Program BNL is seeking to demonstrate significant improvements. One method of demonstration will consist of issuing the remaining (proposed) eight institutional Radiological Control Procedures and translation/incorporation into SBMS Subject Areas. Expectations are as follows:

Outstanding	8 completed by end of first quarter
Excellent	8 completed by end of second quarter
Good	6-7 completed by end of second quarter
Marginal	4-5 completed by end of second quarter
Unsatisfactory	<4 completed by end of second quarter

A second method of demonstrating significant improvement in the Radiological Control Program is for DOE to repeat a minimum of three assessments from the FY98/99 performance years and compare their overall scores to the baseline scores of those years. The recommended assessments to be repeated are contamination control, radiological postings, radiological training, and internal dosimetry.

Overall assessment scores will be determined as outstanding, excellent, good, marginal, unsatisfactory, and then compared to the baseline assessment scores. The expectations in this category will then be made on the following scale.

Outstanding	Four step increase in overall scores
Excellent	Three step increase in overall scores
Good	Two step increase in overall scores
Marginal	One step increase in overall scores
Unsatisfactory	No overall movement in scores Outstanding – 4 points

NOTE: A step increase is considered an incremental change in rating (e.g.; a change from marginal to good is a one step increase, from marginal to excellent is a two step increase). The total number of step increases by summation of the three assessments is the overall score to be rated (i.e.; if two assessments each show a two step increase, the total step increase is 4 - an outstanding rating).

Chemical Safety

As part of its commitment to ES&H Excellence BNL has implemented a Chemical Safety Improvement Plan

In FY00 the Laboratory is committed to achieving key milestones as delineated in the formal project plan, and its predecessor documents, submitted to DOE-BHG and to maintain or accelerate the critical path to project completion.

The key Chemical Safety Program deliverables are:

- BNL Chemical Safety Subject Areas by 4/30/00.
- Incorporate Chemical Safety into Worker Safety & Health Management System Description by 10/11/99.
- Implementation Plan for Chemical Safety Program Revisions by 4/20/00.
- Plan for the line implementation of chemical safety feedback and continuous improvement by 4/4/00.

The FY00 Chemical Safety Improvements deliverables will largely focus on developing requirements, procedures and products needed to achieve chemical safety improvements. Meeting the project milestones above will be considered Excellent performance, and bettering a milestone by 30 days or more will comprise Outstanding performance for that milestone. Missing a milestone by up to 45 days will be considered Good performance for that milestone, but only if the critical path is not adversely affected. Missing a milestone by more than 45 days will be considered Marginal performance for that milestone and by more than 90 days will be considered Unsatisfactory performance for that milestone.

Management Systems

BNL is committed to improving the effectiveness and efficiency of its ES&H related management systems. One such area of improvement is Training Cost Savings/Training Cost Avoidance

To facilitate this BNL will establish baselines for the following Training Organization Data Cost Elements in order to establish incentives for reduced unit costs, increased quality and amount saved. Baselines are to be established for the following five data cost elements.

- Annual Training Organizational Cost
- Average Cost Per Participant
- Average Annual Training Hours Per Employee
- Annual Instances of Training
- Training Investment Per Employee

Other key T&Q initiatives include items 1 through 5 listed below. Each of these will be given a Pass/Fail determination on the basis of whether they are completed and the resulting systems established and incorporated into the management system or not.

1. A Personnel Qualification system will be established for all BNL employees to ensure that employees are trained and qualified to prevent and/or mitigate worker exposures to hazardous conditions and to prevent and/or mitigate impacts to the environment.
2. A system for evaluating the effectiveness of training on-site will be established.
3. A system for the review and updating of course lesson materials as requirements change will be established.
4. A system for implementing a site-wide instructor qualification program will be established.
5. A system for the development of new courses will be established to ensure cost effectiveness of training, including a mechanism for collecting and reporting cost savings or cost avoidance from the use of existing DOE training materials and cost sharing activities.

Expectations are:

Outstanding:	5 initiatives determined as "Pass"
Excellent:	4 initiatives determined as "Pass"
Good:	3 initiatives determined as "Pass"
Marginal:	2 initiatives determined as "Pass"
Unsatisfactory:	1 initiatives determined as "Pass"

In regard to T&Q performance the Laboratory will seek to increase the percentage of required training courses completed by staff as of 9/30/2000 (based on assignment to training and qualification requirements). Expectations are:

Outstanding: >= 95%
Excellent: 90% to < 95%
Good: 85% to < 90%
Marginal: 80% to < 85%
Unsatisfactory: < 80%

Another key ES&H management system improvement initiative is the Lost Workday Case Rate Reduction Program (LWCRRP). In this program, BNL will seek to achieve key milestones as delineated in the formal project plan, and its predecessor documents, submitted to DOE-BHG and to maintain or accelerate the critical path to project completion.

The LWCRRP deliverables are as follows:

- LWCR Final Reduction Plan by 10/30/99.
- Issuance of Subject Areas by 4/30/00.
- Implementation of Supervisor's Clinic Visit Program by 10/30/99.
- Delivery of Performance Trends to Management and Staff within 30 days of previous quarter.
- Develop Department/Division specific LWCR Reduction plans for Plant Engineering, Staff Services, RHIC, Central Shops, AGS, NSLS, Safeguards and Security, Emergency Services, Waste Management, and Supply & Materiel by 1/2000.

The FY00 LWCRRP deliverables would largely focus on developing programs, procedures and policy needed to underpin the project. Meeting the project milestones above will be considered Excellent performance, bettering milestones by 30 days or more will comprise Outstanding performance for that milestone. Missing a milestone by 30-60 days will be considered Good performance for that milestone only if the critical path is not affected. Missing a milestone by more than 60-90 days is Marginal, and by more than 90 days will be considered Unsatisfactory performance for that milestone.

Leadership and Management

Leadership

BNL is committed to evaluating the implementation of a Laboratory Suggestion System. An evaluation will be initiated early in FY00 and a report will be issued soon thereafter.

The following metrics reflect expectations for this report.

Report completed by 12/31/99 - Outstanding
Report completed by 2/28/00 - Excellent
Report completed by 4/30/00 - Good
Report completed by 6/30/00 - Marginal
Report completed after 6/30/00 - Unsatisfactory

BSA will conduct an assessment of Laboratory performance using the Off-Ramp criteria as defined by the Prime Contract.

BNL is also committed to expanding its Mentoring Program for Research Associates and new Scientific Staff members to be implemented by 9/30/00.

Expectations for design and approval of the Mentoring Program are:

Completed by 3/31/00 - Outstanding
Completed by 5/31/00 - Excellent
Completed by 7/31/00 - Good
Completed by 9/30/00 - Marginal
Not completed by 9/30/00 - Unsatisfactory

Infrastructure

BNL is committed to ensuring that its infrastructure planning documents are comprehensive, well written and integrated with BNL mission goals. The following Table identifies the milestones and relative importance (higher points for higher importance) of the key Infrastructure Planning documents planned in FY00.

FY00

PROJECT/TASK	POINTS	MILESTONE
Commitment Affirmation Letter	10	10/31/99
ESH&I Management Plan	20	4/30/00
Institutional Plan, Site & Facilities Section	5	5/30/00
Energy Management Plan	10	5/30/00
GPP Program Plan	10	Eight (8) weeks after DOE approval of CURL
Special Maintenance Program Plan	10	Eight (8) weeks after DOE approval of CURL
Site Master Plan	30	9/30/00
Alternative Financing (ESPC) for Energy Management Study	5	9/30/00

Performance expectations for delivering these documents is based on the total point score as follows:

100	Outstanding
81-90	Excellent
71-80	Good
61-70	Marginal
60 or less	Unsatisfactory

BNL is committed to achieving balanced priorities through prioritization of project needs using DOE validated prioritization methodologies.

Projects will be prioritized at least twice per year and the highest priority projects are funded within available resources. The following specific tasks are expected in FY00.

TASK	MILESTONE
All ADSs received prior to 12/31/99 are processed, scored, binned so as to be considered for the FY01 DOE budget submission	2/15/00
All ADSs received prior to 5/30/99 are processed, scored, and binned to support delivery of the Consolidated Unfunded Requirements List (CURL) to DOE by 10/1/00	8/30/00

As an integral part of Standards-Based Management and Integrated Safety Management BNL is committed to implementation of its Facility Use Agreements. The following Facility Use Agreements milestones are expected for FY00.

PROJECT/TASK	*MILESTONE*
Completion of Facility Use Agreements for "high priority" facilities	3/00
Completion of Facility Use Agreements for balance of BNL facilities	8/00

Performance expectations are as follows:

Missed 0 milestones	Outstanding
Missed 1 milestones	Good
Missed 2 milestones	Unsatisfactory

In the area of reliable utility services BNL expects to monitor its performance in the following manner.

Electric System Reliability (ESR):

$$(ESR) = \frac{\text{Total Customer Hours} - \text{Unplanned Outage Customer Hours}}{\text{Total Customer Hours}}$$

Greater than 0.999	Outstanding
0.998 to 0.999	Excellent
(ESR) = less than 0.994	Unsatisfactory
0.996 to 0.997	Good
0.994 to 0.995	Marginal

Description of Proposed Method

1. When an unplanned electric power outage occurs, an electrical supervisor will log outage.
2. Information will be forwarded to O&M Manager's office, where it will be completed. Data will be tracked monthly.
3. Through the fiscal year, all electric power customer-outage-hours will be totaled to arrive at a figure for total customer-hours outage for the fiscal year.
4. Electric distribution system reliability will be calculated:

$$\frac{\text{Total Customer Hours - Unplanned Outage Customer Hours}}{\text{Total Customer Hours}}$$

Notes:

1. Standard population figures for each building will be supplied by Plant Engineering's planning group and updated periodically.
2. Customer outage hours will be based on the actual time the facilities are without power times the population for those buildings.
3. Total customer hours will be calculated using figures supplied by Plant Engineering's planning group times 8760 hours per year.
4. Only outages due to failures in the BNL-maintained power distribution system (13.8kV and 2400V) will be included. Off-site (LIPA) outages will not be included. Outages due to malfunctions inside buildings will not be included.

In regard to buildings and facilities reliability BNL intends to measure the effectiveness of maintaining buildings in operational status with due consideration of the present (FY99 and FY00) infrastructure budget constraints. We will monitor our performance in the following manner.

Building and Facilities Reliability (BFR):

$$(BFR) = \frac{\text{Total Building Availability } (ft^2\text{–days}) - \text{Building Failures } (ft^2\text{–days})}{\text{Total Building Availability } (ft^2\text{–days})}$$

FY00 Performance Measure

(BFR) =		
	Greater than 0.999	Outstanding
	0.998 to 0.999	Excellent
	0.996 to 0.997	Good
	0.994 to 0.995	Marginal
	Less than 0.994	Unsatisfactory

Description of Proposed Method

1. When an unplanned building system outage or failure occurs which significantly disrupts occupants of a building or renders the space unusable, the cognizant Plant Engineering supervisor will log outage. The information will be forwarded to O&M Manager's office. Data will be tracked.
2. At the end of each reporting period (month), all building failures will be totaled to arrive at a figure for building and facility reliability for the fiscal year.
3. Building and facility reliability will be calculated as a percentage:

$$\frac{\text{Total Building Availability } (ft^2\text{–days}) - \text{Building Failures } (ft^2\text{–days})}{\text{Total Building Availability } (ft^2\text{–days})}$$

Notes:

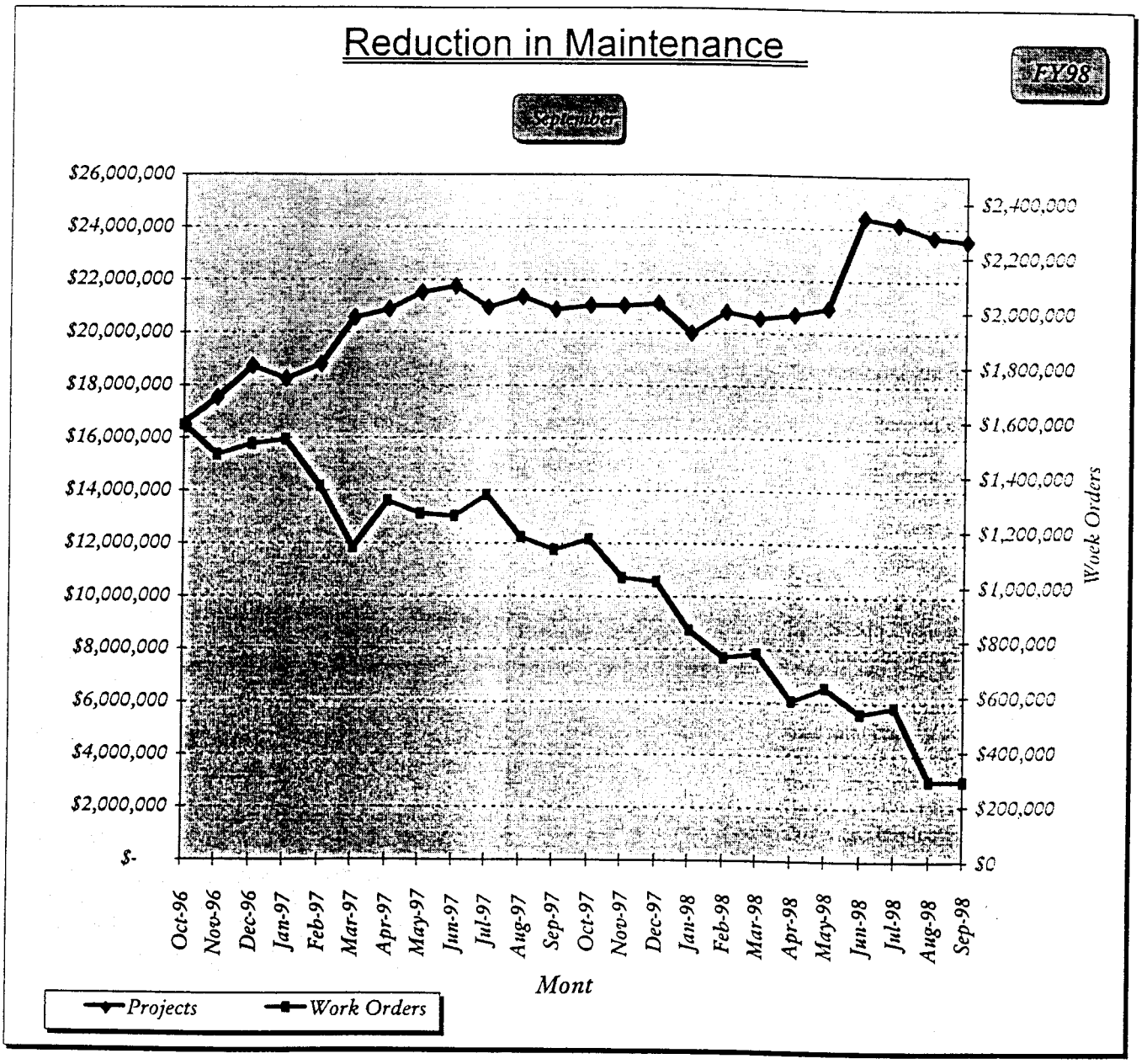
1. Standard square footage for each building will be from Plant Engineering's planning group space database.
2. Building and facility failure days will be based on the actual days the facilities are without critical services (or are unusable) times the normal population for those buildings.
3. Total Building Availability will be calculated using site square footage figures supplied by Plant Engineering's planning group times 365 days per year.

In regard to reduction in maintenance backlog BNL is committed to tracking and improving two categories of maintenance backlog:

Work Order Backlog is defined as the total dollar value of short order tickets (including preventive maintenance) issued for requested or required maintenance, but not yet completed and closed.

Recurring Maintenance Backlog is defined as the total dollar value of the facilities maintenance projects waiting for funding. (These projects are normally funded out of Plant Engineering's "recurring maintenance" budget.)

The methodology for tracking these backlogs is shown in the graph below.



In regard to maintenance of the FIMS Database BNL will implement a two-year plan to fully populate all required fields in DOE's FIMS database and begin validating FIMS data.

Currently, BNL FIMS contains data on approximately 900 assets (e.g., buildings, facilities, portable structures / trailers). It is estimated that, in the recent past, as many as 40 new fields per asset (e.g., 900 x 40 fields) have been added and need to be populated. Researching this additional information (much of which requires analysis or research to input) was not possible with the available resources.

DOE-Chicago has made the population of the FIMS data an LCAM priority.

To monitor progress in this area BNL will ensure the following:

$FIMS_{99}$ = Baseline number of fields unpopulated on 8/31/99

$FIMS_{00}$ = Baseline number of fields unpopulated on 8/31/00

$$\text{Percent change in FIMS} = \frac{FIMS_{00} - FIMS_{99}}{FIMS_{99}}$$

Expectations are reflected as follows:

Percent change in FIMS greater than 50%	Outstanding
Percent change in FIMS 40 to 49%	Excellent
Percent change in FIMS 30 to 39%	Good
Percent change in FIMS 20 to 29%	Marginal
Percent change in FIMS less than 20%	Unsatisfactory

Notes:
a. FIMS99 (percent of fields populated today) = XX.X%
b. Second year plan – complete populating empty fields. Begin program on validating data using random sampling and checking.

BNL is also committed to ensuring that its energy utilization is effectively and efficiently managed and that total energy consumption declines consistent with plans for site growth and operations. To facilitate this the Laboratory will focus on percent reduction in energy consumption per gross square foot. Executive Order 13123, "Greening the Government through Efficient Energy Management," dated 6/3/99, requires that all Federal agencies work to meet Federal energy management goals for FY 2010 and implement strategies to meet those goals.

The DOE has established and maintained a series of progressive energy reduction goals covering the period of FY 1985–2010. The current energy reduction goals are to reduce building energy: 20% by FY 2000; by 30% in FY 2005; and by 35% by 2010, all as compared to FY85.

$$(E) = \frac{\textit{Last FY B\&F Energy Use} - \textit{Current FY B\&F Energy Use}}{\textit{Last FY B\&F Energy Use}}$$

FY00 Performance Measure		
Annual B&F energy increase	over 5%	unsatisfactory
Annual B&F energy increase	0-5%	marginal
Annual B&F energy decrease	0-2%	good
Annual B&F energy decrease	2-4%	excellent
Annual B&F energy decrease	over 4%	outstanding

Description of Proposed Method

1. Calculate and report reduction in building and facility electric and thermal energy consumption (non-metered process / non-programmatic facilities).
2. Compare current fiscal year energy building and facility electric and thermal energy consumption to last year's consumption to measure recent progress toward federal goals. For example:
   - FY98 = 329,905 Btu/SF
   - FY97 = 337,720 Btu/SF
   - FY96 = 350,397 Btu/SF
   - FY95 = 354,641 Btu/SF*
   - FY85 = 434,295 Btu/SF*

   * base year

$$\frac{337{,}720 \text{ Btu/SF} - 329{,}905 \text{ Btu/SF} * 100}{337{,}720 \text{ Btu/SF}} = 2.3\% \text{ reduction}$$

3. Continue to "track and trend" progress in energy reduction – current year to base year – and calculate percent reduction. For example:
   - FY98 = 329,905 Btu/SF
   - FY85 = 434,295 Btu/SF

$$\frac{434{,}295 \text{ Btu/SF} - 329{,}905 \text{ Btu/SF} * 100}{434{,}295 \text{ Btu/SF}} = 24\% \text{ reduction}$$

Notes

a. Metered process not a good performance measure as it is budget driven and dependent on research machine (i.e., RHIC, AGS, NSLS) operational modes.
b. IHEM (energy conservation project) program was discontinued in FY96. Also, this measure can be significantly affected by weather (i.e., heating and cooling degree-days).

Environmental Stewardship

A key element of waste reductions is the recycling of solid waste. To facilitate this BNL will control and reduce the amount of solid waste sent to the landfill through recycling, whenever possible. The quantities (by weight) of solid waste (in various waste streams) recycled and disposed of at the Brookhaven Town Landfill will be measured. The percent of waste that is recycled will be reported.

This measurement is an indicator of the effectiveness of the material recycling and waste reduction efforts at BNL.

Percent Recycled (PR)

$$PR = \frac{\textit{Total tons of solid waste recycled}}{\textit{Total tons of solid waste generated}}$$

FY00 Expectations

Less than 20.0% recycled	Unsatisfactory
25.0% to 29.9%	Marginal
30.0% to 34.9%	Good
35.0% to 44.9%	Excellent
More than 45.0%	Outstanding

Description of Proposed Method

1. Solid waste generated at BNL is either recycled (white/computer paper; mixed paper; cardboard; bottles/cans; tires) or sent to the Brookhaven Town Landfill for disposal (putrescibles; animal waste).
2. Track and record tons of waste recycled and tons of waste sent to Brookhaven Town Landfill. Add recycled and landfilled waste to obtain total tons of solid waste generated at BNL.

Notes

a. Background data:

FY92 percent recycled = 2.9%
FY93 percent recycled = 14.2%
FY94 percent recycled = 27.6%
FY95 percent recycled = 30.5%
FY96 percent recycled = 29.8%
FY97 percent recycled = 22.6%
FY98 percent recycled = 28.7%*
FY99 percent recycled = 43%**

* BNL/Brookhaven Town cooperative recycling program began 3/98.
** To date, (as of 4/99).

b. Measure excludes construction debris (which is normally recycled). The construction debris waste stream varies significantly with annual variations in construction funding and type of construction activity and would significantly distort the measure.
c. Measure excludes hazardous or radioactive wastes.

Business Operations

BNL is committed to conducting a self-assessment using the Balanced ScoreCard model for Procurement and Property Management and in accordance with a Self-Assessment Agreement.

BNL is committed to re-engineer and implement an enhanced Travel Management System.

The current automated Domestic and Foreign travel application is part of the Laboratory's current legacy system and requires upgrading. The planned implementation date for this application is **January 2000**. Initiate a feedback/change control process to further enhance effectiveness and meet customer needs – **April 2000.**

The FY00 deliverables focus on developing and implementing the above modules as well as initiating a feedback/change control process to further enhance their effectiveness and meet customer needs. Meeting the project milestones will be considered Excellent performance, and bettering a milestone by 30 days or more compromise Outstanding performance for that milestone. Missing a milestone by up to 45 days will be considered Good performance for that milestone, but only if the critical path is not adversely affected. Missing a milestone by more than 45 days will be considered Marginal performance for that milestone and by more than 90 days will be considered Unsatisfactory performance for that milestone.

BNL is also committed to purchase and implement a Maintenance Management and Job Cost System for Plant Engineering

The current Maintenance Management system utilized by Plant Engineering is a main frame application that is no longer supported. Replacement of this system will include a Job Cost module that will replace Plant Engineering's portion of JCARS (Job Cost and Reporting System). Coupled with other modules, it will also result in efficiencies as well as the capability to move entirely to a client/server environment. Implementation is scheduled for **January 2000.** Initiation of a feedback/change control process to further enhance effectiveness and meet customer needs is scheduled for **April 2000**.

The FY00 deliverables focus on developing and implementing the above module as well as initiating a feedback/change control process to further enhance their effectiveness and meet customer needs. Meeting the project milestones will be considered Excellent performance, and bettering a milestone by 30 days or more compromise Outstanding performance for that milestone. Missing a milestone by up to 45 days will be considered Good performance for that milestone, but only if the critical path is not adversely affected. Missing a milestone by more than 45 days will be considered Marginal performance

for that milestone and by more than 90 days will be considered Unsatisfactory performance for that milestone.

BNL is also committed to purchase and implement a Shop Management and Job Cost System for Central Shops

Replacement of this system will include a Job Cost module that will replace Central Shops' portion of JCARS (Job Cost and Reporting System). Coupled with other modules, it will also result in efficiencies as well as the capability to move entirely to a client/server environment. Implementation is scheduled for **January 2000.** Initiation of a feedback/change control process to further enhance effectiveness and meet customer needs is scheduled for **April 2000**.

The FY00 deliverables focus on developing and implementing the above module as well as initiating a feedback/change control process to further enhance their effectiveness and meet customer needs. Meeting the project milestones will be considered Excellent performance, and bettering a milestone by 30 days or more compromise Outstanding performance for that milestone. Missing a milestone by up to 45 days will be considered Good performance for that milestone, but only if the critical path is not adversely affected. Missing a milestone by more than 45 days will be considered Marginal performance for that milestone and by more than 90 days will be considered Unsatisfactory performance for that milestone.

In regard to Electronic Publishing BNL is seeking to make its reports for which distribution is unlimited available in full-text electronically to DOE-OSTI and the public on the WWW.

To facilitate this BNL has set a goal to increase the number of BNL Reports, for which distribution is unlimited, that are electronically available in full text on the Laboratory's web pages, to DOE-OSTI for linking from DOE InfoBridge and for access by the general public, by 20% in FY00 (using end of Y 99 total as the base). Expectations for this area are as follows:

Outstanding:	The number of BNL Reports available on the Web increased by 30% or more in FY00.
Excellent:	The number of BNL Reports available on the Web increased by 25% or more in FY 00.
Good:	The number of BNL Reports available on the Web increased by 20% or more.
Marginal:	The number of BNL Reports available on the Web increased by less than 20%, but by at least 15%.
Unsatisfactory:	The number of BNL reports available on the Web less than 15%.

In regard to improving procurement BNL is seeking to minimize the total level of effort required and reduce cycle time by reengineering the process for directly procuring small dollar non-stock commodity items by credit card to minimize the total level of effort required and reduce cycle time.

Expectations for increasing credit card transactions over baseline year (FY99) are as follows:

≥ 30% increase	Outstanding
20% to 29.99% increase	Excellent
10% to 19.99% increase	Good
0% to 9.99% increase	Marginal
Decrease	Unsatisfactory

BNL is also committed to controlling uncosted operating balances for Landlord and EM activities at levels needed to ensure continuity of operations. This encompasses approximately 85% of the DOE funding for BNL.

To facilitate this BNL will monitor the percentage of uncosted operating balances of SC and EM funding to operating funds received in the financial plan.

Expectations in this area are as follows:

6% - 8%	Excellent/Outstanding
9% - 11%	Good
12% - 14%	Marginal
>14%	Unsatisfactory

In regard to a Vital Records BNL is committed to establishing a program to ensure that the records necessary for continuing operations of the Laboratory will be readily accessible and retrievable in the event of a disaster or other emergency situation. To meet this commitment the Laboratory has identified those records considered vital for its continuing operations and has arranged for their secure storage, and systematic updating at an off-site location. Specifications are as follows:

1. In consultation with Emergency Planning staff, develop vital records definition, procedures and guidance on how to identify vital records and issue to all BNL organizations. Update the Records Management System Description and Subject Area as appropriate. (Complete 12/30/99)

2. Develop training on vital records, and procedures for vital records identification and train line managers and Records Management Representatives. (Complete 5/30/00)

3. All Laboratory organizations identify their vital records and update the Laboratory's Records Management Inventory database with the appropriate designation. (Complete 7/30/00)

4. Investigate and cost-out options for off-site storage of vital records and for the continuous updating of vital records. (Complete 9/30/00)

5. Submit Issue and Decision paper to management for decision on options and funding for vital records storage and continuous updating. (Complete 9/30/00)

Expectations in this area are as follows:

Outstanding:	All milestones met or exceeded and all FY00 deliverables completed by 8/1/00
Excellent:	All milestones met or exceeded and all FY00 deliverables completed by 9/30/00
Good:	Some milestones met but with some schedule slippage and FY00 deliverables met by 9/30/00
Marginal:	One or more milestones not met, resulting in late submission of Issue and Decision Paper to management beyond 9/30/00).
Unsatisfactory:	One or more milestones not met after 10/31/00.

BNL intends to significantly enhance its scientific computing infrastructure. In this regard, BNL will:

A. Redirect current Lab-wide assets that are components of a scientific computing infrastructure by:
   1. Identifying current assets by 10/31/99;
   2. Reorganizing ITD to articulate scientific infrastructure by 10/31/99.

B. Survey the Scientific programs to identify and understand significant computational challenges and implementing a schedule that:
   1. Completes the survey process by 1/31/00;
   2. Reports on results of the survey by 3/31/00;
   3. Identifies unmet needs and develops a proposal plan to satisfy them by 5/31/00.

C. Develop a complementary relationship with the newly formed Center for Data Intensive Computing toward the mutual benefit of both organizations by:
   1. Establishing Physical Plant (offices, system space) by 10/31/99;
   2. Making joint appointments by 10/31/99;
   3. Tying-in systems by 2/28/00.

D. Develop an IT Strategic Plan for BNL by:
   1. Conducting an initial meeting to establish the Vision and Mission, and design a planning process by 10/31/99;
   2. Completing the plan and commence its execution by 2/28/00;
   3. Reviewing and revising '8 Principles of IT' as necessary and take steps to ensure Lab-wide compliance by 9/30/00.

E. Identify and deploy outside expertise assets by:
   1. Enlisting individuals and companies as strategic resources by 10/31/99;
   2. Evaluating the effectiveness of information and advice by 6/30/00.

BNL is committed to ensuring that each individual at the Laboratory has access to IT professional development training necessary to make most effective use of IT to perform his or her job. To facilitate this BNL will:

A. Establish a personalized training program for all BNL IT professionals that includes:
   1. Self-assessments and managerial assessments of training needs by 10/31/99;
   2. Identifying courses and other methods of delivery fore each employee by 12/31/99;
   3. Implementing the training and institute continual individualized updates as part of the performance appraisal process by 3/31/00.

B. Establish comprehensive IT training opportunities for all BNL staff that includes:
   1. Assessments against availability of courses and other delivery materials by 12/31/99;
   2. Establishment of new courses as needed, identifying most effective sources by 2/28/00;
   3. Getting management buy-in to provide funds, release time, and tools for effective educational experiences by 2/28/00.

C. Establish a policy on telecommuting for situations where the Laboratory and employee derive mutual benefit that:
   1. Obtains management approval for a pilot project by 11/31/99;
   2. Commences the pilot project by 2/28/00;
   3. Evaluates results of the pilot, makes changes as necessary, and broadens scope if indicated by 9/30/00.

Safeguards and Security

In regard to Safeguards and Security BNL intends to use the DOE-CH biennial inspection process as a basis for assessment of the Laboratory's performance in this area. If an inspection is not conducted during the current assessment period, the appraisal rating for the previous assessment period will be used. Should the Laboratory receive an appraisal rating of less than satisfactory, BNL expects that annual DOE inspections will then be conducted. The Laboratory is required by DOE Order 470.1 to perform a self-assessment of its Safeguards and Security operations in the intervening year between DOE-CH appraisals.

Objective: BNL will conduct Safeguards and Security operations to ensure effective protection of national security interests, proprietary information, personnel, property, and the general public.

Measure: An effective Safeguards and Security Program will ensure cost-effective compliance with all applicable Federal, state, and local laws, and all DOE Orders applicable to Safeguards and Security.

Expectation: The weighted average of all DOE-CH and DOE HQs-assigned appraisal ratings by topical area during the review period.

	Points (PTS)
Program Planning and Management (PPM)	20
Protection Program Operations (PPO)	28
Information Security (INFOSEC)	16
Material Control and Accountability (MC&A)	23
Personnel Security	13
	100

Appraisal Ratings (AR)	
Unsatisfactory	0%
Marginal	50%
Satisfactory	100%

Performance Level	Metrics
Outstanding	96-100
Excellent	91-95
Good	81-90
Marginal	<81

Notes and Assumptions:

a. The Laboratory is required by DOE Order 470.1 to perform a self-assessment in the intervening year between DOE-CH appraisals. As a result of BNL receiving a satisfactory appraisal rating of its Safeguards and Security operations in the most recent DOE-CH inspection safeguards and security operations performance appraisal during FY2000 will be based on the results of BNL's FY2000 self-assessment report for this functional area.

b. Appraisals result in the following ratings, which are translated into a numeric value that can be used to establish metric values and then derive the adjectival rating.

Appraisal Ratings (AR)	
Unsatisfactory	0%
Marginal	50%
Satisfactory	100%

Formula for Calculating Actual Scores

AR% x PTS = AS

DEAR 952.204-2, Security (SEP 97); Federal, state, and local law; and all DOE Orders applicable to Safeguards and Security.

The scope of the self-assessment is identified in Chapter X of DOE Order 470.1.

A mid-year status report and a final report are required per the terms of the contract. Supporting documentation should be referenced and available for review as determined necessary by BHG.

Periodic visits by DOE-CH Safeguards and Security Services (SSS) group to BNL and regular interaction by the DOE-BHG with BNL.

Legal Services

BSA is committed to providing legal services that are timely, cost effective and of high quality. In support of this BSA will execute a litigation management program for cases brought against the Contractor in its operation of the Laboratory that is innovative and complies with the Contractor's DOE-approved litigation management procedures, policies, and Contracting Officer direction and assures that outside counsel provide efficient and effective conduct of litigation at a reasonable cost.

In regard to the number of non-compliances with Contractor's DOE-approved litigation management procedures the following Table reflects expectations for performance.

Outstanding	Excellent	Good	Marginal	
1-10	11-20	21-30	31-40	Minor or
0	1	2	3	Major

Notes and Assumptions:
1. "Minor" generally involves non-compliances relating to invoices;
2. "Major" generally involves non-compliances relating to the contractor/law firm relationship, including documents other than invoices and documentation supporting disbursements.

In regard to the number of cases to which Contractor can demonstrate that it gave thoughtful consideration of the advantages of ADR techniques the following Table reflects expectations for performance.

Outstanding	Excellent	Good	Marginal
All	All but 1	All but 2	All but 3

Notes and Assumptions:
1. "Thoughtful consideration" can be demonstrated by a memorandum-to-file reflecting, timely evaluation of relevant case factors.
2. "Timely" means as appropriate during the litigation process, including in conjunction with case/settlement evaluations at the close of pleadings and at the close of discovery, in accordance with the Contractors DOE-approved litigation management procedures.

In regard to the number and significance of innovative improvements to BNL litigation management program (such as law firm selection, evaluation and incentivization) a subjective evaluation will be made considering, for example:
1. Innovative measures incorporated by the Contractor to manage the cost and performance of outside Counsel; and,
2. Effectiveness of such innovations.

BSA is also committed to ensuring that work products submitted by the Contractor for DOE approval or use are supported by timely, sound/thoroughly researched legal advice. Pursuant to Laboratory policy and procedures, the performance of the BNL Legal Department, in providing sound analysis and counsel on issues requiring legal attention, will be evaluated in a subjective manner, considering, for example:
1. Proactiveness and timeliness of identification by the Legal Department of legal issues for review;
2. Timeliness of work products;
3. The results obtained by the work products;
4. The level of satisfaction expressed by the Contractor management and staff.

In regard to the percentage of on-time responses to DOE-requested legal work products the following Table reflects contract expectations:

Outstanding	Excellent	Good	Marginal
95-100%	90-94%	85-90%	<85%

Notes and Assumptions:

1. Timeliness takes into consideration the amount of advance notice and the availability of prerequisite documents and other inputs.
2. Work products include, but are not limited to:
   - FOIA requests
   - Discovery requests
   - Contingent Liabilities Opinions
   - Quarterly Litigation Status Reports

APPENDIX E

MAKE-OR-BUY PLAN

CONTRACT NO.DE-ACO2-98CH10886
MODIFICATION M040

Make-or-Buy Plan

Brookhaven National Laboratory

September 1999

BSA

BROOKHAVEN NATIONAL LABORATORY
BROOKHAVEN SCIENCE ASSOCIATES
UPTON, NEW YORK 11973-5000
UNDER CONTRACT NO. DE-AC02-98CH10886
UNITED STATES DEPARTMENT OF ENERGY

MAKE OR BUY
IMPLEMENTATION PLAN

This plan has been prepared pursuant to Article 10, DEAR 970.5204-76 (June 1997), "Make or Buy Plan," of BSA's prime contract with the U. S. Department of Energy for the operation of the Brookhaven National Laboratory. It has been developed with a primary focus of providing supplies and services on a least-cost basis, giving due regard to such considerations as quality, affected employees and stakeholders. The Brookhaven National Laboratory will implement the formal aspect of this plan for the areas identified in Section III during FY 2000.

SECTION I – BACKGROUND

The DOE Contract Reform Team, established by the Secretary to conduct a comprehensive review of the Department's contracting practices, has recommended that Management and Operating contractors should make more rational decisions concerning whether to "make" or "buy" the products and services required by a project or program. According to the team, such decisions should be driven by the requirement to be more cost-effective and to be consistent with the long-term strategic objectives of DOE's programs.

Brookhaven Science Associates fully supports the philosophy of the Contract Reform Team. Brookhaven National Laboratory has been implementing it in the management of its prior (AUI) and current (BSA) contracts. In many areas, service contractors supplement BNL staff (e.g., engineering design, Central Shops, job shoppers, and trades) while in others, all required services are procured by contract (e.g., cafeteria operations, construction, Child Development Center operations). A listing of many of the contracted services ("Make or BUY") at BNL is reflected in Attachment I.

It is anticipated that the Laboratory will continue to subcontract the services listed in Attachment I in FY 2000, as well as in future years.

Management at various levels has continually reviewed the methods used for work accomplishment and adjusted the mix as appropriate to meet changing mission requirements while carefully balancing cost and quality. Examples of functional areas reviewed are also reflected in Attachment I.

In addition, two noteworthy examples of ongoing make-or-buy decision-making are BNL's approach to the Environmental Restoration (EM) program and the Financial Services Accounting System.

The EM Program is funded at a level of $18-20 million annually and is being implemented by a small BNL staff managing a series of major and minor fixed-price environmental services contractors and consultants.

The Financial Services Division (FSD) is using technology as an enabler to provide more efficient business processes for the Laboratory. One major change is the replacement of BNL's accounting system and all its feeders with a "Commercial off-the-shelf" suite of integrated financial packages. A subcontractor is performing the majority of this work. In addition the Division utilized "3rd Party Integrators" who have the knowledge and experience of other implementations to supplement its staff.

The implementation of new administrative systems began with installation of the PeopleSoft General Ledger and Project Costing modules in July 1997. Purchasing and Accounts Payable modules were installed prior to FY 1999, and the remaining modules (Inventory, Asset Management Budgeting,

Accounts Receivable, HR/Payroll and Benefits modules) will be implemented during FY 2000 and FY 2001. The estimated subcontracting costs are $384,000 - FY 96, $428,000 - FY 97,$327,000 - FY 98, and projected costs of $172,000 and $235,000 in FY 99 and FY 2000 respectively. Use of a subcontractor significantly reduced the need for manpower increases to the Financial Services Division.

SECTION II – STRATEGY

BSA is responsible for managing contract performance, including planning, placing, and administering subcontracts as necessary to ensure the lowest overall cost and technical risk to the Department of Energy, consistent with concerns of quality and availability, applicable labor laws and regulations, and collective bargaining agreements. To discharge this responsibility in a more effective manner, BSA utilizes a "make-or-buy" decision making process. As a part of this process, the objective is to "buy" indirect-cost functions and routine services unless it can "make" at a lower cost or has other overriding reasons leading to a "make" decision.

The Laboratory has identified several functions that are considered potential candidates for "make-or-buy" evaluation during FY2000. These are included in Section III, Candidate Functions for Evaluation. Using the graded approach, each of these functions will be systematically evaluated against a set of criteria, as outlined in Section IV. These criteria will be used as screens to evaluate and identify factors that may prevent the Laboratory from considering the least cost as a determining factor. The depth of analysis for each criterion will be commensurate with its applicability and its contribution towards the final decision. Results will be documented. The evaluation process will also consider the "make-or-buy" viability at the subfunction level when appropriate.

Policy – "Make-or-Buy" in the Quality Context

The following principles will guide the make-or-buy process at BNL. These principles are consistent with DOE's objectives for quality management and cost-effective operations, while maintaining BSA's commitments to its employees and the local community.

- Routine Services – BSA is committed to obtaining routine services from the least-cost source consistent with applicable labor laws and collective bargaining agreements.

- Excellence in Institutional Management and Facilities Operations – BSA is committed to achieving excellence in the management of the Laboratory and in the planning, design, construction, and operation of its programmatic and infrastructure facilities. All BSA make-or-buy decisions will balance cost and quality to ensure excellence in the final product.

- Quality Considerations – The quality process depends heavily on the correct relationship between management and employees; an environment of trust and communication, labor-management partnering, employee involvement and commitment on the part of leaders that people are, indeed, our most important resource.

- Core Institutional Management Competencies – BSA depends on the quality, technical background and "institutional memory" of its BNL managers to maintain the financial, environmental safety and health, and operational integrity of the Laboratory. The resource represented by the Laboratory's management staff is viewed as a significant core competency,

critical to the Laboratory's continued success and pursuit of excellence. As a result, BSA will not evaluate a broad replacement of its in-house operations by a single integrated contractor. Make-or-buy reviews will focus on discrete operations.

- BNL Subcontracts – The BSA approach to make-or-buy will be structured such that any resulting new service contractors will be under contract to BNL. To deliver the quality performance expected by DOE, BSA must retain management control over all functional areas on site.

- Regional Economic Impacts – We believe BSA has an obligation as a corporate citizen to structure its make-or-buy process to be supportive of Long Island and New York State contractors and suppliers. This may include regional competition and preferences for Long Island and New York firms.

- Collective Bargaining Agreements – BSA has in place Collective Bargaining Agreements with three recognized bargaining units covering many of the functional areas that are or may become appropriate for review under the make-or-buy process. BSA will inform and involve designated representatives of these bargaining units in the process to the extent they agree to participate.

- Employee Information and Support – One of the typically "hidden" costs of a make-or-buy review is the effect on morale, productivity, and turnover of the staff whose jobs are being considered for outsourcing. BSA will take aggressive action to ensure all affected staff are kept informed as the make-or-buy process progresses. We will provide assistance to employees who may be displaced due to a decision to outsource services. Finally, we will encourage successful contractors to offer employment to incumbent BNL employees. All workforce decisions will integrate the requirements of Section 3161 of the 1993 Defense Authorization Act and DOE's implementation of it.

- Small/Small Disadvantaged Business – As part of the make-or-buy process, BSA will analyze the availability of services provided by regional small/small disadvantaged businesses. The decision on subcontract scope will consider this availability.

- Diversity – BSA will consider the potential impacts on the diversity of the in-house workforce, which may result from outsourcing.

- Past Experience - This principle considers the issue or past experience at the Laboratory regarding decisions for the same, or similar, supplies or services.

SECTION III – CANDIDATE FUNCTIONS FOR EVALUATION

The following list includes the non-programmatic functions, which are considered candidates for "make-or-buy" evaluation for FY 2000. This list is a not necessarily all inclusive and may change as new information becomes available or additional needs are identified.

FY 2000 Functional Areas
LAN Operations
Desktop Operations
Computer Hardware Maintenance (ITD)
Photocopying Services

These functions are reflected in Attachment I. Computer Hardware Maintenance was originally scheduled for FY 1999. This evaluation was deferred due to restructuring of the Information Technology Division and hiring a Chief Information Officer. It is now being included in a larger Make or Buy decision in FY 2000, for LAN/desktop operations. Photocopying Services is a proposed area for evaluation. This scope of this evaluation will be dependent on the recommendations off an ongoing reengineering effort.

BSA will identify additional specific Make or Buy functions to be reviewed for FY 2001 through FY 2003. These functions will be selected at the beginning of the fiscal year and added to Attachment I.

SECTION IV – EVALUATION CRITERIA

Each function in Section III will be evaluated in a manner such that the impacts of various factors on the "make-or-buy" decision are properly considered. The applicability and importance of these factors may vary depending upon the item to be evaluated. Generally, the quality performance at least cost should be the determining factor in reaching a "make-or-buy" decision unless an overriding reason is identified through the consideration of criteria 1 through 11 below. Evaluation of each item will include, but not be limited to, the following criteria.

1. **Availability of Satisfactory Source** – This criterion considers the competence, ability, experience, and capacity available from outside sources to establish that they could be responsive and responsible and be able to perform in a timely manner. The consideration will also include the diversity and quality of the vendor's workforce.

2. **Affirmative Action** – This criterion will consider the impact of the Laboratory's policy on affirmative action and upward mobility potential of protected class employees on "make-or-buy" decisions.

3. **Timeliness of Procurement** – This criterion considers the impact of procurement lead time on continuity of the Laboratory's operations and services.

4. **Control of Technical and Schedule Interface** – This criterion considers the Laboratory's ability to effectively control technical and schedule interfaces with other programs or operations as well as the necessity for close interaction between the Laboratory and the suppliers.

5. **Risk** – This criterion considers and quantifies the potential for unwanted negative consequences that may impact quality, cost, schedule, sensitive information, personal safety, property, or environment.

6. **National Security** – This criterion considers the impact on security when the work is of a classified nature or will involve technologies and/or materials that are classified or restricted.

7. **Maintenance of Core Competency** – This criterion considers the impact of outsourcing on the retention of key or unique in-house capabilities, capacities, or personnel deemed essential to recurring support functions or scientific needs. It will also consider whether in-house performance is considered key to ensuring quality, operational continuity, and environmental, safety, and health compliance as well as whether the function involves highly skilled, experienced personnel with knowledge of major BNL systems or facilities.

8. **Proprietary Processes and Information** – This criterion considers the issue or proprietary processes owned by the Laboratory, which may not be legally transferable to the outside source and the issue of proprietary information provided and handled by the Laboratory under CRADAs and other agreements with the private sector.

9. **Impact on Future Mission** – This criterion considers the issue of the impact of a "Make" or "Buy" decision on known future mission or program activities at the Laboratory.

10. **New Facilities** - This criterion considers the issue where the construction of new or additional facilities is required that the cost of such facilities is in he government's best interest when compared to subcontracting or privatization alternatives

11. **Contractual Agreements** – This criterion considers the impact of applicable constraints contained in collective bargaining agreements and other existing contracts on the "make-or-buy" decision. The Laboratory has collective bargaining agreements with three recognized bargaining units [International Brotherhood of Electrical Workers (IBEW) Local 2230, Long Island Guards Union, and Oil Chemical & Atomic Workers International.]

    The IBEW Local 2230 contract prohibits subcontracting for a labor classification covered by the agreement for a period of one year after a layoff by the Laboratory in that classification. Related language establishes an employee (FTE) strength number or "ceiling" above which the Laboratory can layoff without invoking the "subcontracting clause." This language may impede the execution of this Plan by prohibiting the outsourcing of functions currently performed by bargaining unit employees. The IBEW Contract does provide that the Laboratory may be required to subcontract work in responses to a regulation or directive of the Department of Energy. The Union may terminate its contract if subcontracting the work results in a layoff of its members.

In the event it still appears that a "buy" decision is still the preferred decision, anticipated operational improvements and cost will be evaluated (as indicated below) to determine whether outsourcing or in-house performance is the least cost.

Cost Benefit – This criterion considers operational improvements and the comparative cost of performing a function in-house versus contracting it out. The analysis will include, as applicable, the costs for subcontracting, new equipment and facilities for additional personnel and for maintaining continuity of operations when changing suppliers.

Make-or-Buy Plan FY 2000
Attachment I

Service/Function	Must Make	Must Buy	Can Make or Buy	Rationale for Make Decision
Analytical Services/Laboratory Analysis	X	X		BNL maintains an on-site laboratory as a Core Competence while also outsourcing to subcontractors under blanket orders large volume activity (i.e. Environmental Restoration) based on economic advantage due to infrastructure and turn around time.
Architect/Engineer (A/E) & Consulting Engineering Services	X	X		BNL maintains Core Competence A/E capability as part of Plant Engineering operations while also outsourcing to subcontractors under blanket based economic advantage due to irregular demand and turn around time.
Cafeteria Operations*		X		N/A
Chemical Hazardous & Radioactive Waste Disposal		X		N/A
Child Development Center Operation*		X		N/A
Computer Hardware Maintenance		X		N/A
Copier and Printer Maintenance	X	X		BNL maintains Core Competence on-site services to meet tight schedules while also outsourcing to subcontractors under blanket orders routine maintenance.
Environmental Restoration		X		N/A
Fabrication Support (i.e. machine shops)	X	X		BNL maintains an on-site Core Competence to meet unique requirement and schedules from the scientific staff (i.e. RHIC project) as well outsourcing to subcontractors for routine fabrications.
Job Shoppers*		X		N/A
Laboratory Equipment Maintenance	X	X		BNL maintains a Core Competence on-site service for scientific projects (RHIC, AGS and Light Source) as these experiments run 24 hours and cannot wait for repairs. Also outsourcing to subcontractors for routine and backup support .
Laboratory Services (i.e. employment advertising, information systems)	X	X		BNL maintains a Core Competence on site for public affairs to support interaction with the community. Also BNL outsources advertising for routine activities.

Make-or-Buy Plan FY 2000
Attachment I

Service/Function	Must Make	Must Buy	Can Make or Buy	Rationale for Make Decision
Legal Services	X	X		BNL maintains an on-site Core Competence Legal Staff of two while also outsourcing to subcontractors for special needs such as environmental activities and lawsuits.
R&D Technical Assistance	X	X		BNL is a Research and Development Lab and therefore we must maintains an on-site Core Competence while also outsourcing to subcontractors for additional support such as graduate Students and colleges and university collaborating on R&D projects.
Software Support	X	X		BNL maintains an on-site Core Competence to support the Financial Services Computing (Accounting, Acct payable, Accts receivable, IPAP) and ITD for LAN and workstation for administration and research divisions. Also BNL outsource to subcontractors to augment these two division during peak periods and on special projects (i.e. peoplesoft)
Special Materials and Supplies	X	X		BNL maintains an on-site Core Competence to support warehousing of materials for quick turn around to the lab while also outsourcing to subcontractors under blanket orders and credit cards routine items such office supplies
Telecommunications		X		N/A
Training (i.e. computer software and hardware, quality assurance, reactor operation and maintenance, safeguards and security, personnel development)	X	X		BNL maintains an on-site Core Competence for training in areas such as safety while also outsourcing to subcontractors for unique training such as word processing or peoplesoft.
Management of Environmental Restoration Division		X		N/A
Management of the Waste Management Division		X		N/A
Management of the Reactor Division		X		N/A
Laundry**		X		Make-or-Buy Study
Automobile Fleet Operations**	X			Make-or-Buy Study
Temporary Clerical Support**	X			Make-or-Buy Study
Custodial Services**	X			Make-or-Buy Study
Heavy Equipment Maintenance**	X			Make-or-Buy Study

Make-or-Buy Plan FY 2000
Attachment I

Service/Function	Must Make	Must Buy	Can Make or Buy	Rationale for Make Decision
Packaged Boiler Maintenance**	X			Make-or-Buy Study
Painting**	X			Make-or-Buy Study
Security**	X			Make-or-Buy Study
Travel Office Operations**	X			Make-or-Buy Study
Telecommunications System Management Services**		X		N/A
LAN operations Desktop operations & Computer Hardware Maintenance***			X	TBD
Photography Services***			X	TBD

* Represents an activity which is totally subcontracted.
** Represents activities in which a formal report was submitted to DOE-BHG with the rationale for determination
*** Represents function to be evaluated in FY2000

APPENDIX H

(Modified by Mod M040 dated 4/17/00)

SMALL BUSINESS, SMALL DISADVANTAGED BUSINESS, WOMEN-OWNED SMALL BUSINESS, AND HUB ZONE SMALL BUSINESS SUBCONTRACTING PLAN

CONTRACT NO.: DE-ACO2-98CH10886
MODIFICATION M040

SMALL BUSINESS, SMALL DISADVANTAGED BUSINESS,

WOMEN-OWNED SMALL BUSINESS, AND HUB ZONE SMALL BUSINESS

SUBCONTRACTING PLAN

Identification Data

Contractor: BROOKHAVEN SCIENCE ASSOCIATES, LLC

Address: BROOKHAVEN NATIONAL LABORATORY, UPTON, NY 11973-5000

Contract Number: DE-AC02-98CH10886

Item/Service: BASIC RESEARCH

Total Amount of Contract (Including Options): $ 417,959,000

Period of Contract Performance (DAY, MO. & YR.): FY 2000

1. **Type of Plan (check one)**

__X__ **Individual Contract Plan** - Individual contract Plan, as used in this subpart, means a subcontract plan that covers the entire contract period (including option periods), applies to a specific contract, and has goals that are based on the offeror's planned subcontracting in support of the specific contract, except that indirect costs incurred for common or joint purpose may be allocated on a prorated basis to the contract.

_____ **Master Plan** - Master Plan, as used in this subpart, means a subcontracting plan that contains all of the required elements of the individual plan, except goals, and may be incorporated into individual contract plans, provided the master plan has been approve.

_____ **Commercial Products Plan** - Commercial Plan, as used in this subpart, means a subcontracting plan that covers the offeror's fiscal year and that applies to the entire producting of commercial items sold by either the entire company or a portion thereof (e.g., division, plant, or product line). The contractor must provide a copy of the approved plan. **NOTE:** A commercial plan is the preferred the preferred type of subcontracting plan for contractors furnishing commercial items.

2. **Goals**

State separate dollar and percentage goals for small business concerns, small disadvantaged business concerns, women-owned business concerns, and HUB Zone Small Business Concerns as subcontractors, for the basic and each option year, as specified in FAR 19.704

A. Total estimated dollar value of all planned subcontracting, i.e., with all types of concerns under this contract, is $ 137,950,000 .

B. Total estimated dollar value and percent of planned subcontracting with small businesses (includes small disadvantaged businesses, women-owned small businesses, and HUB Zone Small businesses): (% of "A")
$ 75,872,500 and 55 %

C. Total estimated dollar value and percent of planned subcontracting with Small disadvantaged businesses: (% of "A"):

$ 6,987,500 and 5 %

D. Total estimated dollar value and percent of planned subcontracting with Women-owned small businesses: (% of "A"):

$ 6,897,500 and 5 %

E. Total estimated dollar value and percent of planned subcontracting with HUB Zone small businesses: (% of "A"):

$ 2,069,250 and 1.5 %.

The 1.5% HUBZone Goal acceptance is based on the SBA's identifying and processing certified HUBZone Firms which provide goods and/or services required by the Laboratory and logistically capable of serving the Laboratory in an efficient manner.

F. Total estimated dollar value and percent of planned subcontracting with LARGE BUSINESS (% of "A"):

$ 48,282,500 and 35 % Balance of Procurements to GOCO's, Foreign and Universities.

G. Description of all the products and/or services to be subcontracted under this contract, and the types of businesses supplying them; (i.e., SMALL BUSINESS (SB), SMALL DISADVANTAGED BUSINESS (SDB), WOMEN-OWNED SMALL BUSINESS (WOSB), LARGE BUSINESS (LARGE), HUB ZONE SMALL BUSINESS (HUBZONE).

Subcontracted Product/ Service	SB	SDB	WOSB	HUBS	LARGE
A&E	X	X	X		X
CONSTRUCTION	X	X	X		X
R&D	X	X	X		X
SERVICE	X	X	X		X
MAT'L/SUPPLIES	X	X	X		X
ELECTRICAL	X	X	X		X
ADPE	X	X	X		X
EQUIPMENT (MAJOR)	X	X	X		X

H. A description of the method used to develop the subcontracting goals for Small business, small disadvantaged business, women-owned small business concerns, and HUB Zone small business concerns (i.e., explain the method used and state the quantitative basis (in dollars) used to establish the percentage goals, in addition, how the areas to be subcontracted to small business, small disadvantaged business, women-owned small business concerns, and HUB Zone small business concerns were determined, and how the capabilities of small business, small disadvantaged business, women-owned small business, HUB Zone small business were determined – include any source lists used in the determination process).

To develop these goals, small business and SDB subcontracting activity was measured in terms of past annual procurement dollars awarded to SBs and SDBs, percent of annual dollar purchases from SBs and SDBs, the total number of SBs and SDBs doing business with the Laboratory, and self-perception of the potential success of BNL's Small and Small Disadvantaged Business Program. Directorities consulted include: Try Us, The National Minority Business Directory, NY/NJ MPC Directory and NYEX Enterprises.

I. Indirect costs have been _____ have not been __X__ included in the dollar and percentage subcontracting goals stated above. (check one)

J. If indirect costs have been included, explain the method used to Determine the proportionate share of such costs to be allocated as subcontract to small business, small disadvantaged business, women-owned small business concerns, and HUB Zone small business concerns.

N/A

3. **Program Administrator**

Name, title, position within the corporate structure, and duties and responsibilities of the employee who will administer the contractor's subcontracting program.

Name: DENNIS HALL

Title: SMALL & SMALL DISADVANTAGED BUSINESS LIAISON OFFICER

Address: PROCUREMENT & PROPERTY MANAGEMENT DIVISION - BLDG. 355

BROOKHAVEN NATIONAL LABORATORY, UPTON, NEW YORK 11973-5000

Telephone: (516) 344-3173

Duties: has general overall responsibility for the contractor's subcontracting program, i.e., developing, preparing, and executing subcontracting plans and monitoring performance relative to the requirements of this particular plan. These duties include, but are not limited to, the following activities:

A. Developing and promoting company-wide policy initiatives that demonstrate the company's support for awarding contracts and subcontracts to small business, small disadvantaged business, women-owned small business concerns, HUB Zone small business concerns; and assure that small business concerns, and HUB Zone small business concerns are included on the services they are capable of providing;

B. Developing and maintaining bidder's lists of small business, small disadvantaged business, women-owned small business and HUB Zone small business concerns from all possible sources;

C. Ensuring periodic rotation of potential subcontractors on the bidder's lists;

D. Ensuring that procurement "packages" are designed to permit the maximum possible participation of small business, small disadvantaged business, women-owned small business and HUB Zone small business concerns; within State Purchasing laws and regulations;

E. Make arrangements for the utilization of various sources for the identification of small business, small disadvantaged business, women-owned small business and HUB Zone small business concerns such as the SBA's Procurement Marketing and Access Network Pro-Net, the National Minority Purchasing Council Vendor Information Service, the Office of Minority Business Data Center in the Department of Commerce, National Association of Women Business Owner Vendor Information Service, and the facilities of local small business, minority and women associations, and contact with Federal agencies' Small Business Program Managers;

F. Overseeing the establishment and maintenance of contract and subcontract awards records;

G. Attending or arranging for the attendance of company counselors at Small Business Opportunity Workshops; Minority and Women Business Enterprise Seminars, Trade Fairs, Procurements Conferences, etc.;

H. Ensure small business, small disadvantaged business, women-owned small business and HUB Zone small business concerns are made aware of subcontracting opportunities and how to prepare responsive bids to the company;

I. Conducting or arranging for the conduct of training for purchasing personnel regarding the intent and impact of Public Law 95-507 on purchasing procedures;

J. Monitoring the company's performance and making any adjustments necessary to achieve the subcontract plan goals;

K. Preparing, and submitting timely, required subcontract reports;

L. Coordinating the company's activities during the conduct of compliance reviews by Federal agencies;

M. Reviewing solicitations to remove statements, clauses, etc., which may tend to restrict or prohibit small business, small disadvantaged business, women-owned small business, HUB Zone small business concerns participation, where possible;

N. Ensuring that the bid proposal review board documents its reasons for not selecting low bids submitted by small business, small disadvantaged business, women-owned small business, and HUB Zone small business concerns;

O. Ensuring the establishment and maintenance of records of solicitations and subcontract award activity;

P. Ensuring that historically Black colleges and universities and minority institutions shall be afforded maximum practicable opportunity (if applicable);

4. **Equitable Opportunity**

The contractor agrees to ensure that small business, small disadvantaged business, women-owned small business, and HUB Zone small business concerns will have an equitable opportunity to compete for subcontracts. The various efforts include, but are not limited to, the following activities:

A. Outreach efforts to obtain sources:

(i) Contacting small, small disadvantaged (minority) women-owned small Business, HUB Zone small business trade associations .

. Buyers are encouraged to use the NY/NJ Regional Minority

. Vendor Directory, the Dept. of Labor Surplus Trends Directory,

. and other directories provided by local small business and SDB organizations.

(ii) Contacting small business development organizations (identifying small business development organizations).

. The Small Business Administration, NY/NJ Minority Purchasing

. Council, The National Contract Management Association, The

. National Minority Purchasing Council, L.I. Small Business Association, The Office of Minority Business Administration. DOE Small Business Development Center

(iii) Attending small, small disadvantaged (minority), women-owned small business, and HUB Zone small business procurement conference and trade fairs (to the extent known, identifying specific procurement conferences and trade fairs and dates).

.* Suffolk County Women's Initiative Trade Fair & Conference,

.* DOE SDB Conference & Exchange Seminar [Washington, DC];

.* NY/NJ Minority Purchasing Council Trade Fair S/SDB Opportunity

.* Small Business Procurement Fair-Dowling College, Oakdale, NY

.* SBA 8A Matchmaker Event, Brookhaven National Laboratory - 10/28/99

. _____

. _____

(iv) Potential sources will be requested from SBA's Pro-Net System.

(v) Utilizing newspaper and magazine ads to encourage new sources.

B. Internal efforts to guide and encourage purchasing personnel;

(i) Presenting workshops, seminars, and training programs;

(ii) Establishing, maintaining, and using small business, small disadvantaged business, women-owned small business, and HUB Zone small business source lists, guides, and other data for soliciting subcontracts; and

(iii) Monitoring activities to evaluate compliance with the subcontracting plan.

C. Additional efforts:

-Establishment of Individual and Section Goals: Each Buyer/Contract Specialist is expected to individually meet the Laboratory's S/SDB/WOSB/HUB goal for the year. Also, each section of PPM, is expected to meet this goal on a cumulative basis.

-Incentive Awards: A "Minority Buyer of the Year" program has been established to recognize those Buyers/Contract Specialists who best meet the objectives of BNL's SDB Program.

5. **Flow-Down Clause**

The contractor agrees to include the provisions under FAR 52.219-8, "Utilization of Small Business Concerns, Small Disadvantaged Business Concerns, Women-Owned Small Business Concerns, and HUB Zone Small Business Concerns" in all subcontracts that offer further subcontracting opportunities. All subcontractors, except small business concerns, that receive subcontracts in excess of $500,000 ($1,000,000 for construction) must adopt and comply with a plan similar to the plan required by FAR 452.219-9 "Small Business, Small Disadvantaged Business, Women-Owned Small Business, HUB Zone Small Business Subcontracting Plan." (FAR 19.704 (a)(4)).

Such plans will be reviewed by comparing them with the provisions of Public Law 95-507, and assuring that all minimum requirements of an acceptable subcontracting plan have been satisfied. The acceptability of percentage goals shall be determined on a case-by-case basis depending on the supplies/services involved, the availability of potential small, small disadvantaged, women-owned small business, and HUB Zone small business subcontractors, and prior experience. Once approved and implemented, plans will be monitored through the submission of periodic reports, and/or, as time and availability of funds permit, periodic visits to subcontractors facilities to review applicable records and subcontracting program progress.

6. **Reporting and Cooperation**

The contractor gives assurance of (1) cooperation in any studies or surveys that may be required by the contracting agency or the Small Business Administration; (2) submission of periodic reports such as utilization reports, which show compliance

with the subcontracting plan; (3) submission of Standard Form (SF) 294, "Subcontracting Report for Individual Contracts," and SF 295, "Summary Subcontract Report," in accordance with the instructions on the forms; and (4) ensuring that large business subcontractors with subcontracting plans agree to submit Standard Forms 294 and 295.

Reporting Period	Report Due	Due Date
Oct 1 – March 31	SF-294	04/30
Apr 1 – Sept 30	SF-294	10/31
Oct 1 - Sept 30	SF-295	10/30

7. **Recordkeeping**

The following is a recitation of the types of records the contractor will maintain to demonstrate the procedures adopted to comply with the requirements and goals in the subcontracting plan. These records will include, but not be limited to, the following:

A. If the prime contractor is not using Pro-Net as its source for small business, small disadvantaged business, women-owned small business, and HUB Zone small business concerns, list the names of guides and other data identifying such vendors;

B. Organizations contacted in an attempt to locate small business, small disadvantaged business, women-owned small business, HUB Zone small business sources;

C. On a contract-by-contract basis, records on all subcontract solicitations over $100,000 which indicate for each solicitation (1) whether small business concerns were solicited, and if not, why not; (2) whether small disadvantaged business concerns were solicited, and if not, why not; (3) whether women-owned small businesses were solicited, and if not, why not; and (4) reason for failure of solicited small business, small disadvantaged business, women-owned small business, or HUB Zone small business concerns to receive the subcontract award;

D. Records to support other outreach efforts, e.g., contacts with minority, small business, women-owned small business, HUB Zone small business trade associations, attendance at small business, minority, women-owned small business procurement conferences and trade fairs;

E. Records to support internal guidance and encouragement, provided to buyers through (1) workshops, seminars, training programs, incentive awards; and (2) monitoring of activities to evaluate compliance; and

F. On a contract-by-contract basis, records to support subcontract award data including the name, address and business size of each subcontractor. (This item is not required for company or division-wide commercial products plans .)

K. Additional records: _____

This subcontracting plan was submitted by:

Signature: Brian P. Sack

Typed Name: Brian P. Sack

Title: Assistant Laboratory Director
Finance & Administration

Date Prepared: _____

Phone No.: _____

Approval:

Agency: DOE APPROVAL ATTACHED, SEE DOE CH FORM 415e, dtd 1/11/00

Typed Name: ROBERT P. GORDON (Signature)

Title: CONTRACTING OFFICER

Date Prepared: 1-19-00

Phone No.: (516)344-3346

:F\SIMPSON\WP61-MISC-SDBSUB2000

DOE-CH Form 415a (3-88)

U.S. DEPARTMENT OF ENERGY

CHICAGO FIELD OFFICE

PRE-AWARD REVIEW FORM - SMALL/DISADVANTAGED BUSINESS SUBCONTRACTING PLAN

1

TO: Office of Small/Disadvantaged Business Utilization Date: 01-11-00

FROM: T. DRAWBRIDGE (SPECIALIST) of BHO GROUP (BRANCH) (615) 344-3436 (EXTENSION)

SUBJECT: REQUEST FOR SUBCONTRACTING PLAN APPROVAL

DE-AC02-98CH10886 (CONTRACT NO./MODIFICATION NO.) BROOKHAVEN SCIENCE ASSOC, INC (CONTRACTOR)

$ 417,959,000 (TOTAL ESTIMATED COST) $ 417,959,000 (DOE DOLLARS)

☐ Attached is a copy of the cost proposal, the subcontracting plan review checklist, and the proposed subcontracting plan dated _____ submitted for your determination of adequacy for negotiation purposes.

☐ Attached is a Findings and Determination (F&D) requesting an exemption from the Subcontracting Plan Clause of PL 95-507.

Enclosures:
1. Cost Proposal
2. Subcontract Plan
3. Subcontacting Plan Review Checklist
4. Findings and Determination

2

TO: BHO Group (BRANCH)

FROM: Office of Small/Disadvantaged Business Utilization

COMMENTS:

☐ The clauses are not appropriate for this action
☒ The plan as submitted can be used as a basis for negotiation.
☐ The plan as resubmitted on _____ can be used as a basis for negotiation.
☐ Plan is not acceptable for the following reason(s).

SIGNED: Debby Thompson DATE: 01-11-00

White Copy - Return to CD Yellow Copy - Retain by SADBU

* U.S. GPO: 1992-645-244/70070

JAN. -11. 00 (TUE) 16:42 CD TEL:1 630 252 2522 P.002

ATTACHMENT 1

A. The estimated total dollars available in the Laboratory's FY 2000 budget (based on current BNL budget projections) are as follows:

Operating Funds	$369,461,000
Equipment Funds	$ 35,169,000
General Plant Projects	$ 5,582,000
Major Construction Projects	$ 7,747,000
TOTAL	**$ 417,959,000**

B. The estimated total dollars available for procurement are as follows:

Operating Funds	$ 71,237,000
Equipment Funds	$ 15,080,000
General Plant Projects	$ 5,746,000
Major Construction Projects	$45,887,000
TOTAL	**$137,950,000**

C. Present indications are that the dollars available for procurement next year may be broken down further into the following categories:

1. Operating Funds

a.	Materials & Supplies	$ 35,292,000
b.	Purchased Labor	$ 26,844,000
c.	Stockroom	$ 9,101,000
	Operating Subtotal...	**$ 71,237,000**

2. Equipment Funds $15,080,000

3. General Plant Projects ..... $ 5,746,000

4. Major Construction Projects ..... $ 45,887,000

TOTAL..... $137,950,000

D. The Laboratory plans to place approximately 55% of its procurement dollars ($137,950,000) with small businesses, roughly as follows:

a. Socio-economically Disadvantaged Business..... 5%
($ 6,897,500)

b. Small Business Set-Aside.....43.5%
($60,008,250)

c. Woman Owned Small Business..... 5%
($6,897,500)

d. Hub-Zone Small Business..... 1.5%
($2,069,250)

TOTAL..... 55%
($75,872,500)

e. Records to support other outreach efforts: Contact with Disadvantaged (Minority) and Small Business Trade Associations, etc. Attendance at small and minority business procurement conferences and trade fairs.

f. Records to support internal activities to guide and encourage buyers: Workshops, Seminars, Training programs, etc. Monitoring activities to evaluate compliance.

g. On a contract-by-contract basis, records to support subcontract award data to include name and address of subcontractors.

	Prior Year Goals Through Sept 30, 1999	Prior Year Achievements Through Sept. 30, 1999
Total Subcontract dollars	$140,185,000	$109,135,336*
Small Business dollars	$ 63,083,250	$ 69,973,773
Small Business percent	45%	64.1%
Small Disadvantaged dollars	$ 7,009,250	$ 9,850,371
Small Disadvantaged percent	$ 5%	9.0%
Small Woman Owned dollars	$ 7,009,250	$ 8,467,076
Small Woman Owned percent	5%	7.8%

GOALS PROJECTED FOR CURRENT YEAR

	Standard
Total Subcontracting dollars	$137,950,000
Small Business dollars	$ 75,872,500
Small Business percent	55%
Small Disadvantaged dollars	$ 6,897,500
Small Disadvantaged percent	5%
Small Woman Owned dollars	$ 6,897,500
Small Woman Owned percent	5%
Small Hub Zone dollars	$ 2,069,250
Small Hub Zone percent	1.5%

*Excludes purchases from government sources, GOCO's, Foreign & Universities which amounted to $25,132,567.

:attachment1.99.#5

APPENDIX I

(Modified by Mod M040 dated 4/17/00)

DOE DIRECTIVES

There is no List A to this Appendix.

List B to this Appendix contains two parts as follows:

Part I: " Directives List"

This section contains a list of Directives that are considered by DOE as applicable to the BNL contract.

Part II: "Partial Deletions of Directives"

This section contains a list of Directives that were accepted and implemented by the previous contractor but have subsequently been revised by DOE to remove certain sections.

DIRECTIVES LIST		
DATE	**DOE DIRECTIVE NUMBER**	**SUBJECT TITLE**
7/14/99	N 142.1	UNCLASSIFIED FOREIGN VISTS AND ASSIGNMENTS
7/26/99	N 205.1	CRD - UNCLASSIFIED CYBER SECURITY PROGRAM
11/1/99	N 205.2	CRD - FOREIGN NATIONAL ACCESS TO DOE CYBER SYSTEMS
4/15/99	N 350.5	CRD - USE OF FACILITY CONTRACTING EMPLOYEES FOR SERVICES TO DOE IN THE WASHINGTON, D.C., AREA
7/15/97	N 440.1	CRD - INTERIM CHRONIC BERYLLIUM DISEASE PREVENTION PROGRAM
9/30/95	N 441.1	RADIOLOGICAL PROTECTION FOR DOE ACTIVITIES (using ORNL/TM-11497 in lieu of Attachment 1)(Extended until 6/30/00 by DOE N 441.4 dated 11/20/98)
11/3/99	O 110.3	CRD - CONFERENCE MANAGEMENT
9/29/95	O 130.1	CRD - BUDGET FORMULATION PROCESS
9/25/95 10/26/95 8/21/96	O 151.1 Change 1 Change 2	CRD - COMPREHENSIVE EMERGENCY MANAGEMENT SYSTEM
9/30/96	O 200.1	CRD - INFORMATION MANAGEMENT SYSTEM
9/27/95 10/26/95 5/1/95	O 210.1 Change 1 Change 2	CRD - PERFORMANCE INDICATORS AND ANALYSIS OF OPERATIONS INFORMATION
12/8/97	O 224.1	CRD - CONTRACTOR PERFORMANCE-BASED BUSINESS MANAGEMENT PROCESS
11/26/97	O 225.1A	CRD - TYPE A AND B ACCIDENT INVESTIGATIONS
9/30/95 10/26/95 11/7/96	O 231.1 Change 1 Change 2	CRD - ENVIRONMENT, SAFETY & HEALTH REPORTING
8/1/97	O 232.1A	CRD - OCCURRENCE REPORTING AND PROCESSING OF OPERATIONS INFORMATION (As modified by letter Grahn/Gordon, dated 4/10/98, effective 5/5/98)
7/21/97	M 232.1-1A	OCCURRENCE REPORTING AND PROCESSING OF OPERATIONS INFORMATION (As modified by letter Grahn/Gordon, dated 4/10/98, effective 5/5/98)
8/17/98	O 241.1	CRD - SCIENTIFIC AND TECHNICAL INFORMATION (STI) MGMT.
1/30/98	O 251.1A	CRD - DIRECTIVES SYSTEM
12/30/96	O 311.1A	CRD - EQUAL EMPLOYMENT OPPORTUNITY AND DIVERSITY PROGRA
DIRECTIVES LIST		

DATE	DOE DIRECTIVE NUMBER	SUBJECT TITLE
9/30/96 5/8/98	O 350.1 Change 1	CRD - CONTRACTOR HUMAN RESOURCE MANAGEMENT PROGRAMS CRD - EMPLOYEE BENEFITS
12/6/95	O 413.1	CRD - MANAGEMENT CONTROL PROGRAM
3/5/97	O 413.2	CRD - LABORATORY DIRECTED RESEARCH AND DEVELOPMENT
11/24/98	O 414.1	CRD - QUALITY ASSURANCE
10/13/95 11/16/95 10/24/96	O 420.1 Change 1 Change 2	CRD - FACILITY SAFETY
11/5/98 5/26/99	O 420.2 Change 1	CRD - DOE O 420.2, SAFETY OF ACCELERATOR FACILITIES
12/28/98	O 425.1A	CRD - DOE O 425.1A, STARTUP AND RESTART OF NUCLEAR FACILITIES, DATED 12/28/98
10/14/98	O 430.1A	CRD - LIFE CYCLE ASSET MANAGEMENT
6/13/96	O 430.2	IN HOUSE ENERGY MANAGEMENT (NO CONTRACTS REQUIREMENT DOCUMENT)
7/9/99	O 435.1	CRD - RADIOACTIVE WASTE MANAGEMENT (Cancels D0E 5820.2A)
7/9/99	M 453.1-1	RADIOACTIVE WASTE MANAGEMENT MANUAL
3/27/98	O 440.1A	CRD - WORKER PROTECTION MANAGEMENT FOR DOE CONTRACTOR EMPLOYEES
9/25/95 10/13/95 10/26/95	O 440.2 Change 1 Change 2	CRD - AVIATION
2/1/99	O 442.1	CRD - DEPARTMENT OF ENERGY EMPLOYEE CONCERNS PRG.
10/2/96	O 460.1A	CRD - PACKAGING AND TRANSPORTATION SAFETY
9/27/95 10/26/95	O 460.2 Change 1	CRD - DEPARTMENTAL MATERIALS TRANSPORTATION AND PACKAGING MANAGEMENT
9/28/95 6/21/95	O 470.1 Change 1	CRD - CONTRACTOR SAFEGUARDS AND SECURITY PROGRAM REQUIREMENTS (Extended until 9/29/00 by DOE N 470-1 dated 9/23/99)
12/23/98	O 470.2	CRD - SAFEGUARDS AND SECURITY INDEPENDENT OVERSIGHT PROGRAM
9/25/95	O 471.1	CRD - IDENTIFICATION AND PROTECTION OF UNCLASSIFIED CONTROL NUCLEAR INFORMATION (Extended until 9/25/00 by DOE N 471.1 dated.9/2/99)
3/27/97	O 471.2A	CRD - INFORMATION SECURITY PROGRAM (Extended until 9/26/00 by DOE N 471.2, dated 9/23/99)

DIRECTIVES LIST

DATE	DOE DIRECTIVE NUMBER	SUBJECT TITLE
1/6/99	M 471.2-1B	CRD - PROTECTION AND CONTROL OF CLASSIFIED MATTE
8/3/99	M 471.2-2	CRD - CLASSIFIED INFORMATION SYSTEMS SECURITY MANUAL
3/24/97	O 472.1B	CRD - PERSONNEL SECURITY ACTIVITIES
5/22/98	M 472.1-1	PERSONNEL SECURITY PROGRAM MANUAL (See CRD for DOE O 472.1B)
8/11/99	O 474.1	CRD - CONTROL AND ACCOUNTABILITY OF NUCLEAR MATERIALS
8/11/99	M 474.1-1	CRD - MANUAL FIOR CONTROL AND ACCOUNTABILITY OF NUCLEAR MATERIALS
5/8/98	M 475.1-1	CRD - IDENTIFYING CLASSIFIED INFORMATION
9/30/96	O 481.1	CRD - WORK FOR OTHERS (NON DOE FUNDED WORK)
9/29/95	O 534.1	CRD - ACCOUNTING (Extended until 9/29/00 by DOE N 534.1 dated 9/29/99)
6/23/92	1270.2B	SAFEGUARDS AGREEMENT WITH THE INTERNATIONAL ATOMIC ENERGY AGENCY
5/19/92	1300.2A	DEPARTMENT OF ENERGY TECHNICAL STANDARDS PROGRAM
8/23/90	1300.3	POLICY ON THE PROTECTION OF HUMAN SUBJECTS
11/10/86 2/5/87 6/17/87 12/22/87 3/30/89 5/18/90 2/28/92 7/6/94	1500.3 Change 1 Change 2 Change 3 Change 4 Change 5 Change 6 Change 7	FOREIGN TRAVEL AUTHORIZATION
5/18/92	2030.4B	REPORTING FRAUD, WASTE, AND ABUSE TO THE OFFICE OF INSPECTOR GENERAL
1/27/93	2100.8A	COST ACCOUNTING, COST RECOVERY, & INTERAGENCY SHARING OF INFORMATION TECHNOLOGY FACILITIES
7/14/88 10/5/88 5/18/92	2110.1A Change 1 Change 2	PRICING OF DEPARTMENTAL MATERIALS AND SERVICES
6/8/92	2300.1B	AUDIT RESOLUTION AND FOLLOWUP
	5/18/92	COOPERATION WITH THE OFFICE OF INSPECTOR GENERAL
2/10/94	4330.4B	MAINTENANCE MANAGEMENT PROGRAM (Nuclear Facilities Portion Only)
11/9/88 6/29/90	5400.1* Change 1	GENERAL ENVIRONMENTAL PROTECTION PROGRAM

DIRECTIVES LIST		
DATE	**DOE DIRECTIVE NUMBER**	**SUBJECT TITLE**
2/8/90 6/5/90 1/7/93	5400.5* Change 1 Change 2	RADIATION PROTECTION OF THE PUBLIC AND THE ENVIRONMENT
5/15/84 5/16/88 5/16/89 9/20/91	5480.4* Change 1 Change 2 Change 3	ENVIRONMENTAL PROTECTION, SAFETY, AND HEALTH PROTECTION STANDARDS
7/9/90 5/18/92	5480.19 Change 1	CONDUCT OF OPERATIONS REQUIREMENTS FOR DOE FACILITIES
11/15/94	5480.20A	PERSONNEL SELECTION, QUALIFICATION AND TRAINING REQUIREMENTS FOR DOE NUCLEAR FACILITIES
12/24/91	5480.21	UNREVIEWED SAFETY QUESTIONS
2/25/92 9/15/92 1/23/96	5480.22 Change 1 Change 2	TECHNICAL SAFETY REQUIREMENTS
4/10/92 3/10/94	5480.23 Change 1	NUCLEAR SAFETY ANALYSIS REPORTS
1/19/93	5480.30	NUCLEAR REACTOR SAFETY DESIGN CRITERIA
9/20/91	5530.1A	ACCIDENT RESPONSE GROUP
1/14/92 4/10/92	5530.3 Change 1	RADIOLOGICAL ASSISTANCE PROGRAM
5/8/85	5560.1A	PRIORITIES AND ALLOCATIONS PROGRAM
8/1/80	5610.2	CONTROL OF WEAPON DATA
7/15/94	5632.1C*	PROTECTION AND CONTROL OF SAFEGUARDS AND SECURITY INTERESTS
4/13/94	5632.7A	PROTECTIVE FORCE PROGRAM
5/26/94	5660.1B	MANAGEMENT OF NUCLEAR MATERIALS
9/4/92	5670.3	COUNTERINTELLIGENCE PROGRAM
5/18/92	5700.7C	WORK AUTHORIZATION SYSTEM

ACCOUNTING PRACTICES AND PROCEDURES HANDBOOK		
5/2/83	Chapter V	INVENTORIES
6/30/80	Chapter X	PRODUCT COST ACCOUNTING

Appendix I - Part II

PARTIAL DELETIONS OF DIRECTIVES				
DATE	DOE DIRECTIVE NUMBER	SUBJECT TITLE	DELETION DIRECTIVE DATE	SECTIONS DELETED
11/9/88 6/29/90	5400.1 Change 1	GENERAL ENVIRONMENTAL PROTECTION PROGRAM	O 231.1 9/30/95 Change 1 10/26/95 Change 2 11/7/96	Paras. 2d, 2b, 4b & 4c of Chap II; Paras 2d & 3b of Chap III; Para 10(c) of Chap IV
2/8/90 6/5/90 1/7/93	5400.5 Change 1 Change 2	RADIATION PROTECTION OF THE PUBLIC AND THE ENVIRONMENT	O 231.1 9/30/95 Change 1 10/26/95	Chapter II: Para 1a(3) (a)
5/15/84 5/16/88 5/16/89 9/20/91	5480.4 Change 1 Change 2 Change 3	ENVIRONMENTAL PROTECTION, SAFETY, AND HEALTH PROTECTION STANDARDS	O 440.1 9/30/95 Change 1 10/26/95	Attachment 2: Paras 2c, 2d(2) - (3), 2e(1) - (8); and Attach. 3: Paras 2c,; 2d(2) - (3), 2e(1) - (7)
7/15/94	M5632.1C-1	MANUAL FOR PROTECTION AND CONTROL OF SAFEGUARDS AND SECURITY INTERESTS	O 470.1 9/28/95 O 471.2A 3/27/97	Chapter XI Chapter III, Paras 1, 2, 4-9

APPENDIX L

FY2000 FEE COMPUTATION

FEE BASIS

Unlike FY 1999, the FY 2000 performance measure model is slightly different. The model for FY 2000 has two classes of performance measures in Appendix B of the Prime Contract. One class of performance measures will be directly associated with fee (fee bearing), the other class will be used solely as an indicator of a system's well being (and thus is **not** fee bearing). The number of functional areas to be rated remains unchanged at four. The area previously entitled Operational Excellence has been fine-tuned and changed to Environment, Safety and Health. The area previously entitled Environmental Stewardship has been incorporated into the new functional area entitled Leadership & Management.

1. The maximum fee is to be in consonance with fees paid for the operation of similar FFRDC laboratories and will have a singlar tier structure;

2. The fees for integrated subcontractor(s) are included in the total fee;

3. The fee structure is to be based on individual critical outcomes and their associated weights as determined separately;

4. The critical outcome of Science and Technology will act as a "gate," in that a score of Excellent or above is required; there will be no fee if any critical outcome is scored as Marginal or below.

Maximum Fee

The maximum fee that BSA can earn under this matrix for FY 2000 is $7,000,000, if all performance measure areas were rated as "outstanding."

Fee Matrix and Fee Percentage Curve (Figure 1)

In consideration of the fee basis, Figure (1) below is the fee-determining matrix for the case where Science and Technology (S&T) achieves a score of Excellent or above. The right two columns of the Figure (1) matrix contain a fee percentage that determines the fee earned within each of the score ranges of Outstanding, Excellent, Good and Marginal. In the event that a Critical Outcome score is between two matrix scores, the fee percentage will be determined by interpolation.

If S&T achieve a score below Excellent, the fee matrix is inapplicable. If S&T is scored in the Good range, a single partial-cost-recovery fee of $2.1M (the annual BSA operating budget) is applicable. If S&T is Marginal there will be no fee, as with the non-science critical outcomes.

Fee for Integrated Subcontractors

The Laboratory's "integrated subcontractors" are defined as those subcontractors that are part of the BNL management structure and have responsibilities for the supervision of BNL employees. The total maximum earnable fee of $7.00M is directly related to the accomplishment of the FY2000 BNL total business base of $420M. In FY2000, BSA's integrated subcontractor(s) fee is to be in the same proportion as the subcontractors' work to the total business base. The maximum earnable fee for BSA is the only fee pool available for the integrated subcontractors. BSA will negotiate the integrated subcontractor's fee and pay that fee from its total earned fee.

Article 36 Payments and Advances

For purposes of installments of fixed-fee in accordance with paragraph (a) of Article 36, the fee amount against which the 90% payment is authorized for FY 2000 is $5,833,333. If after DOE's evaluation of BSA's performance for FY2000 a higher amount of fee is authorized then BSA may draw the difference between the higher fee and the amount received through the periodic installments for FY 2000. If however, after DOE's evaluation of BSA's performance for FY2000 a lower amount of fee is authorized BSA will reimburse DOE all amounts received through periodic installments above the authorized fee amount within 30 days after receiving notice from DOE of the fee authorized for FY2000.

Brookhaven Science Associates
Fiscal Year 2000

APPENDIX L

Figure (1): Fee Determination Matrix (000)

Citical Outcome (CO)		Science & Technology	Commun-ications & Trust		ES&H		Leadership & Management		Max Fee: $ 7,000		
CO Weight		60%	5%		10%		25%		% of Max Fee		
CO Max Fee		$ 4,200.0	$ 350.0		$ 700.0		$ 1,750.0		Science		Non-Science
	Score										
	4.00	4,200.0	350.0		700.0		1,750.0		100.0%		100.0%
Outstanding	3.75	4,128.6	344.1		688.1		1,720.3		98.3%		98.3%
	3.50	4,061.4	338.5		676.9		1,692.3		96.7%		96.7%
	3.25	3,990.0	332.5		665.0		1,662.5		95.0%		95.0%
Excellent	3.00	3,780.0	315.0		630.0		1,575.0		90.0%		90.0%
	2.75	3,570.0	297.5		595.0		1,487.5		85.0%		85.0%
	2.50	3,360.0	280.0		560.0		1,400.0		80.0%		80.0%
	2.25	Flat 2,100.0	253.8	*	507.5	*	1,268.8	*	30.0%	**	72.5% *
Good	2.00	Flat 2,100.0	227.5	*	455.0	*	1,137.5	*	30.0%	**	65.0% *
	1.75	Flat 2,100.0	201.3	*	402.5	*	1,006.3	*	30.0%	**	57.5% *
	1.50	Flat 2,100.0	175.0	*	350.0	*	875.0	*	30.0%	**	50.0% *
	1.25								0.0%		0.0%
Marginal	1.00	**No Fee**							0.0%		0.0%
	0.75								0.0%		0.0%
	0.50								0.0%		0.0%

* No Fee for this category, if Science/Technology is rated "Good".

** This reflects a percentage of total fee.

Note: If any of the Critical Outcomes are rated less than "Good" then the Contractor earns no fee for FY 2000.

APPENDIX N

CHRONIC BERYLLIUM DISEASE PREVENTION PROGRAM (CBDPP)

Contract No.: DE-AC02-98CH10886
Modification No.: M040

APPENDIX N

CHRONIC BERYLLIUM DISEASE PREVENTION PROGRAM (CBDPP)

The Contractor shall support the Chronic Beryllium Disease Prevention Program, as specified in the Federal Register; Part III, Department of Energy, 10 CFR Part 850, Chronic Beryllium Disease Prevention Program; Final Rule, dated December 8, 1999. The above referenced DOE regulation is hereby incorporated into the contract as an attachment to this Appendix.

Attachment:
Federal Register, CBDPP, Final Rule, dtd. 12/8/99

federal register

Wednesday
December 8, 1999

Contract No.: DE-AC02-98CH10886
Modification M040
Appendix N

Part III

Department of Energy

10 CFR Part 850
Chronic Beryllium Disease Prevention Program; Final Rule

DEPARTMENT OF ENERGY

10 CFR Part 850

[Docket No. EH–RM–98–BRYLM]

RIN 1901–AA75

Chronic Beryllium Disease Prevention Program

AGENCY: Office of Environment, Safety and Health, Department of Energy.

ACTION: Final rule.

SUMMARY: The Department of Energy (DOE) is today publishing a final rule to establish a chronic beryllium disease prevention program (CBDPP) to reduce the number of workers currently exposed to beryllium in the course of their work at DOE facilities managed by DOE or its contractors, minimize the levels of, and potential for, exposure to beryllium, and establish medical surveillance requirements to ensure early detection of the disease. This program improves and codifies provisions of a temporary CBDPP established by DOE directive in 1997.

EFFECTIVE DATE: This rule is effective January 7, 2000.

FOR FURTHER INFORMATION CONTACT: Jacqueline D. Rogers, U.S. Department of Energy, Office of Environment, Safety and Health, EH–51, 1000 Independence Avenue SW, Washington, DC 20585, 301–903–5684.

SUPPLEMENTARY INFORMATION:

I. Introduction
A. Background
B. Chemical Identification and Use
C. Health Effects
1. Chronic Beryllium Disease
2. Beryllium Exposures at DOE Operations
3. Epidemiology
4. Value of Early Detection
II. Legal Authority and Relationship to Other Programs
III. Overview of the Final Rule
IV. Section-by-Section Discussion of Comments and Rule Provisions
A. Subpart A—General Provisions
B. Subpart B—Administrative Requirements
C. Subpart C—Specific Program Requirements
List of Commenters
V. Procedural Requirements
A. Review Under Executive Order 12866
B. Review Under the Regulatory Flexibility Act
C. Review Under the Paperwork Reduction Act
D. Review Under the National Environmental Policy Act
E. Review Under Executive Order 13132
F. Review Under Executive Order 12988
G. Review Under the Unfunded Mandates Reform Act of 1995
H. Review Under Small Business Regulatory Enforcement Fairness Act of 1996
Appendix A to the Preamble—References
Appendix B to the Preamble—Questions and Answers Concerning the Beryllium Induced Lymphocyte Proliferation Test (Be–LPT), Medical Records, and the Department of Energy (DOE) Beryllium Registry

I. Introduction

This final rule implements a chronic beryllium disease prevention program (CBDPP) for the Department of Energy (DOE or the Department). This program will reduce the number of workers currently exposed to beryllium at DOE facilities managed by DOE or its contractors, minimize the levels of, and potential for, exposure to beryllium, establish medical surveillance requirements to ensure early detection of disease, and improve the state of information regarding chronic beryllium disease and beryllium sensitization.

On December 3, 1998, DOE published a Notice of Proposed Rulemaking (NOPR) for public comment in the **Federal Register** (63 FR 66940) proposing regulations for a chronic beryllium disease prevention program. The public comment period for the NOPR ended on March 9, 1999. DOE received 36 comment letters. In addition, public hearings were held on February 3, 1999, in Oak Ridge, Tennessee; February 9, 1999, in Golden, Colorado; and February 11, 1999, in Washington, DC. Comment letters were received from private individuals, DOE contractors, other federal agencies, trade associations, academia, public health and medical professionals, and attorneys.

On June 3, 1999, DOE published a notice of limited reopening of the comment period (64 FR 29811) to solicit public comments on options that DOE was considering for the criteria to be used for the release or transfer of equipment and other items previously used in DOE beryllium operations, either to other DOE facilities or to the public. In response to this reopening of the comment period, DOE received 15 additional comments.

DOE has carefully considered the comments and data from interested parties, as well as reference works, journal articles, and other information relevant to the subject of the rulemaking.

A. Background

DOE has a long history of beryllium use because of the element's broad application to many nuclear operations and processes. Beryllium metal and ceramics are used in nuclear weapons, as nuclear reactor moderators or reflectors, and as nuclear reactor fuel element cladding. At DOE, beryllium operations have historically included melting, casting, grinding, and machine tooling of parts.

Inhalation of beryllium dust or particles can cause chronic beryllium disease (CBD) or beryllium sensitization. CBD is a chronic, often debilitating, and sometimes fatal lung condition. Beryllium sensitization is a condition in which a person's immune system becomes highly responsive (allergic) to the presence of beryllium in the body. There has long been scientific consensus that exposure to airborne beryllium is the only cause of CBD.

As of September 1999, among the 11,266 current and former DOE federal and contractor workers who were screened for the disease, 130 workers had been diagnosed with CBD, and another 277 workers had become sensitized to beryllium. DOE anticipates an increase in the number of workers who may be exposed to beryllium as DOE moves forward with deactivating and decommissioning former nuclear weapons production facilities.

The current worker protection permissible exposure limit (PEL) of 2 $\mu g/m^3$, measured as an 8-hour, time-weighted average (TWA), was adopted by the Occupational Safety and Health Administration (OSHA) in 1971 and codified in 29 CFR 1910.1000, Tables Z–1, Z–2 and Z–3 by reference to existing national consensus standards. DOE's predecessor agency, the Atomic Energy Commission (AEC), had previously established the same limit of 2 $\mu g/m^3$ for application at its facilities in 1949, and that limit has remained in effect at DOE's facilities up to the present. In 1977, the National Institute for Occupational Safety and Health (NIOSH), a federal agency, recommended to OSHA an exposure limit of 0.5 $\mu g/m^3$ for beryllium. NIOSH, at the same time, classified beryllium as a potential occupational carcinogen.

Between the 1970s and 1984, there appeared to be a significant reduction in the incidence rate of CBD. This, coupled with the long latency period for the disease, led to the assumption that CBD was occurring only among workers who had been exposed to high levels of beryllium decades earlier (e.g., in the 1940s). However, the number of confirmed cases of CBD, more recent data suggesting the occurrence of CBD among workers with low-level exposures, and the expected future increase in the number of workers potentially exposed to beryllium (during decontamination and decommissioning activities) all indicate a need for more

aggressive workplace controls to minimize worker exposure to beryllium in the DOE complex.

In December 1998, the American Conference of Governmental Industrial Hygienists (ACGIH) published a Notice of Intended Change for its beryllium exposure limit. ACGIH is a professional organization that develops and publishes consensus occupational health standards. In the Notice, ACGIH proposed an 8-hour TWA of 0.2 $\mu g/m^3$ to help minimize the occurrence of CBD and sensitization. DOE's NOPR did not address ACGIH's proposed change because publication of the NOPR preceded ACGIH's announcement.

DOE has reviewed current technical information and is of the opinion that it is difficult to determine the exposure level that is necessary to eliminate the risk of contracting CBD. Until OSHA completes its rulemaking, DOE has decided to implement an aggressive, two-pronged exposure reduction and minimization program that is expected to further protect DOE federal and contractor workers from the hazards associated with exposure to beryllium. While DOE acknowledges that this rule may not eliminate the risk of contracting CBD, DOE believes that this rule will significantly decrease the number of workers exposed and the level of exposure to beryllium, and therefore, is expected to decrease disease. First, DOE is establishing an 8-hour TWA action level of 0.2 $\mu g/m^3$ that triggers certain workplace precautions and control measures. Second, DOE is requiring its contractors and any covered DOE employers to establish in their CBDPPs exposure reduction and minimization measures designed to reduce potential exposure to levels below the action level. This program will enhance and supplement existing worker protection programs established under DOE Order 440.1A, Worker Protection Management for DOE Federal and Contractor Employees.

This rulemaking initiative was preceded by several years of information gathering and data analysis. In 1996, DOE surveyed its contractors to characterize the extent of beryllium usage, the types of tasks involving beryllium usage, the controls in place for each task, the estimated number of workers exposed during each task, and the estimated exposure levels associated with each task. This survey found that between 1994 and 1996, 10 of the 15 DOE sites surveyed performed 64 different operations or processes that could expose workers to beryllium. The surveyed DOE sites estimated that between 518 and 530 workers in 58 different job categories were potentially exposed to beryllium in the performance of these 64 operations or processes. These estimates were updated in 1999 through a cost survey conducted by the Office of Environment, Safety and Health (1999 Environment, Safety and Health Cost Survey). In this survey, 14 DOE sites indicated that they would be affected by the proposed rule. These sites reported that 1,634 workers in more than 100 different job categories would be potentially exposed to beryllium and 1,236 of these workers (75.6 percent) would be potentially exposed at the proposed action level or PEL.

The 1996 survey also provided information on exposure levels experienced by workers at the surveyed sites. Although the exposure data were not comprehensive, the reported 8-hour TWA exposure data (personal breathing zone monitoring results) for these workers ranged from nondetectable to 25 $\mu g/m^3$. Most of these exposure levels were reported to be below the 2 $\mu g/m^3$ 8-hour TWA PEL. To control worker exposures in the affected processes or operations, the surveyed sites reported the use of various engineering and administrative controls, including ventilation hoods, glove boxes, wet machining methods, high-efficiency particulate air (HEPA) vacuums, regulated areas, action levels and administrative warning levels, and personal protective equipment. The survey showed that beryllium exposure controls varied considerably among the DOE facilities.

To supplement the data obtained from the 1996 survey, the Department published a **Federal Register** notice on December 30, 1996, requesting scientific data, information, and views relevant to a new DOE beryllium health standard (61 FR 68725). This was followed by two Beryllium Public Forums, one held in Albuquerque, New Mexico, and one held in Oak Ridge, Tennessee, in January 1997.

Acting on the information compiled from these various sources, and in view of the time needed to promulgate a rule, then-Secretary of Energy Pena directed the Office of Environment, Safety and Health to publish a new DOE policy to protect the workforce while the Department moved forward with its rulemaking process. DOE Notice 440.1, Interim Chronic Beryllium Disease Prevention Program, was signed by Secretary Pena and issued on July 15, 1997. This interim Notice established a CBDPP that enhanced and supplemented worker protection programs under DOE Order 440.1A.

Because of the complexity and significance of issues regarding the development of a DOE beryllium worker protection rule, Secretary Pena also established the Beryllium Rule Advisory Committee (BRAC) in June 1997 to advise DOE on issues pertinent to the proposed rulemaking. The BRAC, which consisted of a diverse set of stakeholders and recognized experts from DOE, other federal agencies, industry, labor, medicine, and academia, explored issues and generated recommendations for consideration in the development of a CBDPP rule.[1]

B. Chemical Identification and Use

Beryllium (atomic number 4) is a silver-gray, metallic element with a density of 1.85 g/cm^3 and a high stiffness. The second lightest of the metals, beryllium also has a high melting point (1285° C) and heat absorption capacity; a pound of beryllium will absorb as much heat as 5 pounds of copper.

Beryllium occurs naturally in the earth's surface in about 30 minerals found in rocks, coal and oil, soil, and volcanic dust. Beryllium used in industry begins as a silicate ($BeSiO_3$) in beryl and bertrandite ores. In very pure crystalline form, beryl takes the form of gems, such as blue-green aquamarine and green emeralds. Bertrandite is mined in Utah. The United States is the world's leading producer, processor, and consumer of beryllium products.

Beryllium, discovered in 1798, was not widely used in industry until the 1940s and 1950s. Beryllium can be used as a pure metal, mixed with other metals to form alloys, processed to salts that dissolve in water, and processed to form oxides and ceramic materials.

Beryllium metal has been produced for various industrial uses, especially in the aerospace and defense industries. Both structural and instrument grade materials are manufactured, including windshield frames and other structures in high-speed aircraft and space vehicles, aircraft and space shuttle brakes, satellite mirrors and space telescopes, inertial guidance systems and gyroscopes, neutron moderators or reflectors in nuclear reactors, X-ray windows, and nuclear weapons components.

In alloys, beryllium confers on metal specific properties of resistance to corrosion, wear, and fatigue; high electrical and thermal conductivity;

[1] Individual members and groups of members made BRAC recommendations. The recommendations were generated by the facilitated process used during the meetings and were not adopted by the committee as consensus opinions. For convenience of reference these recommendations are referred to as the "BRAC recommendations."

strength; and hardness. Beryllium-copper (BeCu) alloys usually contain about 2 percent beryllium, but vary greatly in composition to meet different industrial and consumer needs. Beryllium is also added to aluminum, nickel, zinc, and zirconium for some applications. Beryllium alloys are used for springs, switches, relays, and connectors in automobiles, computers, radar and telecommunications equipment, and other instruments; high-strength non-sparking tools; molds or casts to make metal, glass, and plastic items; sports equipment such as golf clubs and bicycle frames; and dental bridges and related applications.

Other beryllium materials include soluble salts and oxides. Beryllium soluble salts, such as beryllium fluoride, chloride, and sulfate, are used in nuclear reactors, in glass manufacture, and as catalysts for certain chemical reactions. Beryllium Oxide (BeO) is used to make ceramics for electronics, and other electrical equipment. Beneficial properties of BeO include hardness, strength, excellent heat conductivity, and good electrical insulation.

C. Health Effects

DOE received a number of comments (Exs. 2, 5, 14, 19, 20, 22, 23, 24, 26, 29, 30)[2] regarding the "Health Effects" section of the NOPR. DOE has carefully considered these comments and has revised the following health effects discussion as appropriate.

1. Chronic Beryllium Disease

Chronic beryllium disease (CBD) is a granulomatous lung disease that is caused by the body's immune system response (similar to an allergic reaction) to inhaled dust or fumes containing beryllium metal, alloys, beryllium compounds or mixtures, or insoluble beryllium salts. The body's immune system response to beryllium is often called beryllium sensitization. Beryllium sensitization precedes the development of CBD. Sensitization can occur quickly or many years after exposure to beryllium, progressing into disease at a rate of approximately 10 percent a year (ref. 1)[3].

It is hypothesized that beryllium is a hapten (a substance that provokes an immune response only when combined with another substance, generally a protein) that binds to peptides on mucosal surfaces. In susceptible individuals the beryllium-peptide complex initiates an immune response, which may progress ultimately to granuloma formation in the pulmonary interstitium. Data have suggested that CBD can occur at relatively low exposure levels and, in some cases, after relatively brief durations of exposure. The International Agency for Research on Cancer (IARC) and ACGIH classify beryllium as a human carcinogen.

Frequently reported symptoms include one or more of the following: dyspnea (shortness of breath) on exertion, cough, fever, night sweats, and chest pain and, less frequently, arthralgias (neuralgic pain in joints), fatigue, weight loss, or appetite loss. On physical examination, a doctor may find signs of CBD results, such as rales (changes in lung sounds), cyanosis (lack of oxygen), digital clubbing, or lymphadenopathy (enlarged lymph nodes). A radiograph (X-ray) of the lungs may show many small scars. Patients may also have an abnormal breathing test, pulmonary function test, and a blood test, the peripheral blood beryllium-induced lymphocyte proliferation test (Be–LPT). Examination of the lung tissue under the microscope may show granulomas, which are signs of damage due to the body's reaction to beryllium. CBD may be confused with other lung diseases, especially sarcoidosis. In advanced cases, there may be manifestations of right-sided heart failure, including cor pulmonale (enlarged right ventricle of the heart caused by blockage in the lungs).

The Be-LPT is highly specific for beryllium sensitivity and has a high predictive value for beryllium disease. It is the most definitive means of ruling out beryllium disease as the cause of non-specific lung and other symptoms. Therefore, this measurement of sensitization to beryllium identifies at-risk individuals, as well as individuals whose lung problems are not beryllium related (ref. 1). For individuals whose Be-LPT screening results exceed a certain threshold, an additional Be-LPT is conducted on cells washed from a segment of the lung. The presence of granulomata in the lung of an individual with a positive lung Be-LPT confirms the presence of CBD. In the absence of granulomata or other clinical evidence of CBD, individuals with a positive Be-LPT are classified as sensitized to beryllium.

The clinical course of CBD is highly variable. Some individuals deteriorate rapidly; most experience long, gradual deterioration. Treatment consists of oral corticosteroid therapy. Individuals with impaired respiratory gas exchange may require continuous oxygen administration.

Individuals sensitized to beryllium are asymptomatic and not physically impaired. Once sensitization has occurred, it is medically prudent to prevent additional exposure to beryllium. Individuals with CBD have a clinical illness varying from mild to severe. In severe cases, the affected individuals may be permanently and totally disabled. Mortality of the sensitized individuals directly attributable to CBD and its complications is estimated to be 30 percent (ref. 2). This estimate is based upon historical data reflecting both the higher levels of exposure that occurred in the workplace prior to regulation of workplace exposure in the late 1940s and a tracking of the medical history of subjects of CBD over several decades. DOE's more recent experience with improved diagnoses and treatments may result in a lower mortality rate for CBD cases.

2. Beryllium Exposures at DOE Operations

DOE's medical surveillance programs are discovering cases of CBD among workers who were first exposed after 1970, when DOE facilities were expected to maintain workers exposure to beryllium below the OSHA PEL. As of June 1999, 119 workers (88 at the Rocky Flats facility in Golden Colorado, 29 at the Y–12 Plant in Oak Ridge, Tennessee, and two at the Hanford facility in Richland, Washington) have been diagnosed with CBD, and another 258 workers (197 at the Rocky Flats facility, 59 at the Y–12 Plant, one at the Hanford facility, and one at the Mound facility in Miamisburg, Ohio) have been diagnosed as sensitized to beryllium from among approximately 10,000 current and former DOE federal and contractor workers who were screened for the disease.

A worker's exposure is measured by personal monitoring, which is accomplished by sampling the air within the breathing zone of the worker. Personal monitoring of occupational exposures to beryllium was not widely adopted at DOE sites until the 1980s. Prior to the 1980s, many sites relied on area monitoring to assess occupational exposures to beryllium. However, results from area monitoring have been shown to significantly underestimate actual exposure levels. Since 1984, personal sampling data have provided more precise information on occupational exposure to beryllium at DOE sites.

Available personal sampling data provides a clear indication of the low

[2] A list of commenters is included as an appendix to the Section-by-Section Discussion of Comments and Rule Provisions in this Supplementary Information section.

[3] A listing of references is included as an appendix to this Supplementary Information section.

levels of beryllium exposure that can be achieved in both fabrication and machining operations, and decommissioning and decontamination projects, when effective control strategies are implemented. Most beryllium fabrication and machining operations at DOE have occurred to date at the Rocky Flats facility, and at the Y-12 Plant. Over time, engineering improvements and advanced control strategies have significantly reduced occupational beryllium exposure levels in these operations.

Since 1980, and continuing through 1996, about 1600 personal samples were collected at the Oak Ridge Y-12 Plant (Table 1). These samples were taken at several different Y-12 operations associated with CBD, with a bias toward sampling those jobs where exposure potential was greatest or where previous monitoring results were high. Despite this bias, over two-thirds of sample results were below the limit of detection of 0.1 $\mu g/m^3$ for the sampling and analytical method used at Y-12.

TABLE 1.—OAK RIDGE Y-12 PLANT PERSONAL SAMPLING FOR BERYLLIUM EXPOSURE

	1980 to 1989	1990 to 1996
Number of Samples	148	1448
Estimated Arithmetic Mean Level of Exposure [1]	0.9 $\mu g/m^3$	0.3 $\mu g/m^3$
Percent of Samples Less Than 2 $\mu g/m^3$ [2]	94%	98%

[1] The arithmetic mean was estimated from the samples using linear regression.
[2] Samples were analyzed using flame spectroscopy with a detection limit of about 0.1 $\mu g/m^3$.

These Y-12 data are from beryllium operations where cases of CBD have been found. The facilities where these operations take place have not been remodeled since the 1970s. Thus the differences between sampling results measured before and after 1990 are attributed to changing work practices. For example, increased monitoring in the 1990s identified a greater number of exposures over the existing exposure limit. The investigations of these exposures resulted in changes to work practices that had contributed to the high exposures. This focus on operations with elevated exposure levels also led to a significant reduction in average exposure levels.

Personal sampling data from the Rocky Flats Building 444 Beryllium Machine Shop (Table 2) collected in 1984–85 and then again in 1986 after extensive remodeling to the ventilation system illustrates the impact and effectiveness of engineering modifications to control exposure.

TABLE 2.—ROCKY FLATS BUILDING 444 BERYLLIUM MACHINE SHOP PERSONAL SAMPLING DATA (BERYLLIUM EXPOSURE)

	1984 to 1985	1986
Number of Samples	99	279
Estimated Arithmetic Mean Level of Exposure [1]	1.19 $\mu g/m^3$ [1]	0.035 $\mu g/m^3$
Percent of Samples Less Than 2 $\mu g/m^3$ [2]	84%	99.6%

[1] The arithmetic mean was estimated from the samples using linear regression.
[2] Samples were analyzed using graphite furnace atomic absorption (AA) or Inductively Coupled Plasma (ICP) spectroscopy with a detection limit of about 0.01 $\mu g/m^3$.

The samples collected in 1984 and 1985 were the first personal samples collected in this shop following the discovery of a case of CBD in 1984. Controls in that machine shop had previously been judged to be adequate based on area monitoring. In addition to the extensive remodeling of the ventilation system in the shop to minimize leakage from ventilation hoods, operations performed outside of hoods were eliminated to the extent possible. The improved engineering controls in this shop reduced average exposure levels by a factor greater than 30, to levels approaching 1% of the existing PEL.

A final example, taken from personal sampling data collected during the decontamination of Rocky Flats Buildings 865 and 867 in 1995–1996, further demonstrates the low levels of beryllium exposure which can be achieved through the implementation of effective controls (Table 3). Each worker was sampled during each work shift during this time period.

TABLE 3.—DECONTAMINATION OF ROCKY FLATS BUILDINGS 865 AND 867 PERSONAL SAMPLING—1995 TO 1996

Number of Samples	7,673
Arithmetic Mean Level of Exposure.	0.03 $\mu g/m^3$
Percent of Samples Less Than 2 $\mu g/m^3$.	99.8%

As can be seen from the foregoing examples, machining and D&D operations at Y-12 and Rocky Flats achieved an exceptional level of exposure control.

While the application of controls eliminates predictable sources of exposure, there still can be large day-to-day variations in exposure. The exposures that remain are likely to reflect accidents, equipment failures, or poor work planning. Meeting exposure minimization goals will require planning to limit the potential for such occurrences, and monitoring to detect those that do occur, so they can be investigated and future occurrences can be prevented.

3. Epidemiology

Epidemiology is the field of public health that examines relationships between disease in people, and exposures or events that are related to that disease. Occupational epidemiology is the study of the effects of workplace exposures on the frequency and distribution of diseases and injuries.

Hardy and Tabershaw (ref. 3) reported the first evidence of the existence of CBD in a 1946 paper. The paper described "delayed chemical pneumonitis" among fluorescent lamp workers exposed to beryllium compounds. The differential diagnosis included sarcoidosis (an immune disease of unknown etiology) and tuberculosis.

There also are reports of CBD in individuals without known occupational exposure to beryllium. Under the direction of Dr. Thomas Mancuso, 16 cases of CBD were

diagnosed by X-ray examination among 20,000 residents living near a beryllium production facility in Lorain, Ohio (ref. 4). Likewise, a 1949 report described 11 patients with CBD who lived near a beryllium extraction plant (ref. 5). Ten of these 11 lived within ¾ of a mile of the plant, and exposure from plant discharges into the air was the suggested cause of their CBD. Measurements of air concentrations of beryllium at various distances from the plant provided the basis for the Environmental Protection Agency's (EPA's) community permissible exposure limit (24-hour ambient air limit of 0.01 microgram of beryllium per cubic meter of air [μg/m³]).

In addition, CBD has been reported among family members of beryllium workers who were presumably exposed to contaminated work clothing during the 1940s and 1950s (refs. 6, 7). The virtual disappearance of CBD caused by air pollution or household exposures has been attributed to more stringent control of air emissions and improved work practices, such as mandatory work clothing exchange. However, as recently as 1989, a woman previously diagnosed with sarcoidosis was diagnosed with CBD. She had no occupational exposure, but her husband was a beryllium production worker. This is the first new case of non-occupational CBD reported in 30 years (ref. 8).

Sterner and Eisenbud suggested that CBD was a highly selective immunologic response. Their conclusion was based on epidemiologic evidence that (1) severe cases have occurred at low exposure; (2) the level of beryllium contained in tissue did not correlate with the extent of the disease; (3) there was a correlation between disease and low atmospheric concentration, but not high concentrations; (4) the onset of symptoms could occur years after the termination of exposure; and (5) pulmonary lesions were not easily reproduced in animals (ref. 7).

A registry of production plant CBD cases was started at Columbia University in 1947. A second registry of phosphor-lamp CBD cases was started around the same time. In 1952, a Beryllium Case Registry was established at the Massachusetts Institute of Technology (MIT), where files from the other beryllium registries were consolidated. The consolidated Beryllium Case Registry was moved to Massachusetts General Hospital in the 1960s, and ultimately was relocated to the National Institute for Occupational Safety and Health (NIOSH) in 1978. At that time, the Beryllium Case Registry contained 622 cases of CBD, 224 cases of acute beryllium disease, and 44 acute cases that developed into CBD. Twenty-three cases were attributed to household exposures and 42 to air pollution (ref. 6). The Beryllium Case Registry, which is now inactive, was criticized as deficient in acquiring data on cases, identifying populations at risk (denominator data), maintaining follow-up of questionable cases, and obtaining exposure data (ref. 9).

According to criteria utilized by the Beryllium Case Registry, the diagnosis of CBD included at least four of the following six criteria, with one of the first two conditions required: (1) the establishment of beryllium exposure based on occupational history or results of air samples, (2) the presence of beryllium in lung tissue or thoracic lymph tissue or in the urine, (3) evidence of lower respiratory tract disease and a clinical course consistent with beryllium disease, (4) pathological changes consistent with beryllium disease upon examination of lung tissue or thoracic lymph nodes, (5) radiologic evidence of interstitial lung disease, and (6) decreased pulmonary function tests (ref. 10).

The beryllium-induced lymphocyte proliferation test (Be-LPT) in blood and bronchoalveolar lavage (BAL) fluid have allowed earlier identification of the disease. The BAL Be-LPT now is one of the criteria required for diagnosis (refs. 11–13). Beryllium has been found to act as a specific antigen, causing proliferation and accumulation of beryllium-specific helper T lymphocytes ($CD4^+$) in the lung (ref. 14). Current data suggest that the peripheral blood Be-LPT is a specific and sensitive method for testing beryllium sensitivity (ref. 11). The presence of granulomatous tissue in the lung along with a positive BAL Be-LPT is considered definitive evidence for diagnosis of CBD (ref. 12). When a worker has clear signs and symptoms of interstitial lung disease and a positive Be-LPT, CBD may be presumed only if performing a bronchoscopy on the worker is deemed to be too risky given the health status of that of that worker.

An article published by Cullen et al. in 1987 reported on an epidemiology study of CBD among precious-metal refinery workers (ref. 15). In 1993, researchers at the National Jewish Medical and Research Center (NJMRC) published two reports on epidemiology studies that were designed to determine the incidence of CBD among beryllium workers and the value of the Be-LPT in detecting CBD (refs. 16, 17). One of these two studies was conducted at DOE's Rocky Flats Environmental Technology Site (Rocky Flats). These three epidemiology studies showed that CBD incidence among exposed workers was the same as had been reported among workers exposed in the 1940s, when the disease was first recognized. This exposure limit was originally derived by analogy to other toxic metals (ref. 18). A decline in the number of reports of CBD in the 1970s and up to 1984 led to the assumption that the 2 μg/m³ limit had been effective in preventing CBD (ref. 6). DOE recognizes that the 1980s–1990s studies used more effective screening and diagnostic methods than the earlier studies. Nevertheless, these 1980s–1990s studies provide strong evidence that adherence to the OSHA standard has not prevented new cases of disease.

In 1991, responding to NJMRC findings, DOE's Office of Environment, Safety and Health initiated a beryllium worker health surveillance program at Rocky Flats to provide medical screening to current and former beryllium workers who had not participated in the NJMRC studies. In addition, the Office of Environment, Safety and Health initiated a study at the Oak Ridge Y–12 Plant (Y–12) in 1991 to learn if the NJMRC findings on CBD incidence and the effectiveness of the Be-LPT could be replicated. Results to date confirm NJMRC findings that CBD incidence rates are high and that the Be-LPT is an effective screening test for CBD as shown in Table 4.

TABLE 4.—RESULTS OF MEDICAL SCREENING OF BERYLLIUM-EXPOSED WORKERS AT THREE DOE SITES THROUGH DECEMBER 1997

	Rocky Flats	Y–12	Mound
Individuals Examined	6,257	1,949	632
Abnormal Be-LPT Number (percent)	221 (3.5%)	77 (4%)	1 [1]
Completed Diagnostic Exams	186	33	0

TABLE 4.—RESULTS OF MEDICAL SCREENING OF BERYLLIUM-EXPOSED WORKERS AT THREE DOE SITES THROUGH DECEMBER 1997—Continued

	Rocky Flats	Y–12	Mound
CBD Number (percent)[2]	79 (1.3%)[3]	25 (1.3%)[4]	0

[1] The one Mound employee who was found to be consistently positive declined diagnostic testing. Four others had one positive blood test result and were awaiting retesting.

[2] Includes 44 cases confirmed through biopsy and testing of lavage cells and 35 presumptive cases in which the pulmonologist diagnosed CBD but biopsy and/or lavage could not be completed.

[3] Includes 56 cases found through the surveillance program since 1991, 17 cases through the 1987–1991 NJMRC study, and 6 cases between 1984 and 1987 for a total of 79 CBD cases. Six of the 79 cases had consistently normal Be-LPT results and were identified through lung disease symptoms or abnormal chest X-rays.

[4] Includes 17 cases found in the surveillance program since 1993, 2 cases found in 1991 among beryllium workers who had been diagnosed with other lung diseases, and 6 cases found by the site clinic in 1993 among 146 currently exposed beryllium workers who were provided the Be-LPT.

In 1996, three studies reported on exposure to beryllium associated with CBD and immunologic sensitization to beryllium (refs. 19–21). Two of the studies reported on cases of CBD at Rocky Flats (refs. 19, 20). The third reported on an epidemiology study of a private sector beryllium ceramics fabrication plant that began operating in 1981 (ref. 21). Both Rocky Flats and the ceramics plant were extensively monitored for compliance with the current OSHA 8-hour TWA exposure standard of 2 $\mu g/m^3$. The authors concluded that exposures among the highest exposed groups in the plants were, on average, below the 2 $\mu g/m^3$ limit. At both plants, cases of CBD and sensitization to beryllium were found not only among the highest exposed workers, but also among the lowest exposed workers, including administrative and other personnel who did not work directly with beryllium.

Stange and colleagues reported on the findings of a health surveillance program at Rocky Flats that used the Be-LPT to screen for CBD (ref. 19). Of 97 individuals who tested positive on the Be-LPT, 28 were found to have CBD. The article included an analysis of the work histories of these 97 current and former workers. A qualitative exposure estimate based on the work histories of individuals who developed CBD concluded that exposures varied by more than one order of magnitude. Extensive air monitoring data were available for machinists, which were one of the highest exposed groups.

Barnard and colleagues completed an extensive analysis of the monitoring data associated with machining operations at Rocky Flats (ref. 20). Prior to 1984, air monitoring was accomplished with fixed area monitors located near the machine tools that were thought to be the primary sources of emissions into the work-rooms. In 1984, personal sampling was initiated, which was more representative of individual exposure. The article reported a high degree of uncertainty in exposure assessments prior to 1984 due to the lack of correlation between area monitoring and personal monitoring. The authors concluded that machinists, as a group, shared similar exposure potential, that average exposures were less than but near the 2 $\mu g/m^3$ limit, and that excursions above the limit were common.

Kreiss and colleagues studied CBD occurring in a beryllium oxide ceramic manufacturing plant (ref. 21). They found that machinists had the highest incidence rate of beryllium sensitization and the highest exposure potential. The area monitoring conducted in this plant was aimed at estimating exposures associated with job titles and was found to correlate with personal sampling. The authors concluded, "the existing data suggests that the machining exposures resulting in the 14.3 odds ratio for beryllium sensitization were largely within those permitted by current regulations." This article confirmed the findings of a study of CBD in the neighborhood of a beryllium extraction plant, which showed a correlation between ambient beryllium levels and incidence of CBD (ref. 5). Further analyses of CBD incidence at Rocky Flats, as yet unpublished, showed a similar higher risk for machinists compared to that for other workers (See Table 5).

TABLE 5.—INCIDENCE RATES OF CBD AT ROCKY FLATS

Job category	Number tested	CBD cases	Incidence rate (percent)
Beryllium Machinist	223	21	9.4
Administrative	1,903	23	1.2
Professional	1,396	15	1.1
All Employees Tested	6,254	64	1.0

Cases of CBD have occurred in machinists who worked in the Y–12 beryllium ceramic machine shop, where levels have been quite low. Only a small percentage of samples there have detected beryllium. Continuous area air monitors have operated in the shop throughout its existence. One area sample indicated levels above 2 $\mu g/m^3$ when a machine tool was operated with an exhaust duct that was disconnected. No other area measurements above 2 $\mu g/m^3$ were recorded, and the median measurement was at the level of detection.

Kreiss (ref. 22) describes the relative hazards in sectors of the beryllium industry, and risk factors for CBD and sensitization related to work processes in a beryllium manufacturing plant that produced pure metal, oxide, alloys, and ceramics. Employees in the pebble plant (producing beryllium metal) had the highest prevalence of CBD (6.4%) compared with other workers (1.3%). The pebble plant was not associated with the highest gravimetric industrial hygiene measurements, indicating that total beryllium was probably not a good indicator for hazard surveillance. The

report indicates that particle size or other characteristics may be more important contributors to risk than the total mass of breathing zone particles, that daily-weighted averages are poor estimates of personal exposure, and that methods of exposure assessment may poorly reflect actual exposures from accidents.

Several authors have highlighted the uncertainty that exists in the exposure assessments (refs. 20, 21, 23). The chemical composition of the beryllium materials used and the particle size distribution of the aerosol created by the work operation affect the bioavailability of beryllium, and neither is accounted for by current personal sampling and analytical methods. It is not known what percentage of measurable airborne beryllium is capable of reaching the regions of the lung where health effects occur. In addition, area monitoring used in the past does not correlate with the personal monitoring that is thought to be more representative of exposure (refs. 20, 23).

Epidemiologic investigations to date have failed to show whether the time course of exposure (dose rate) is biologically significant. High day-to-day variation in exposure level and excursions above the 2 $\mu g/m^3$ limit have occurred in all groups studied for which exposure data is available. Excursions make up a significant contribution to individuals' total doses, confounding attempts to understand if dose rate is an important risk factor. Beryllium oxide and metal in the lung dissolve slowly over a period of months and years (ref. 24), producing the beryllium ion that elicits an immune response (ref. 25). The persistent presence of the beryllium ion in the lung makes CBD a chronic disease (ref. 26). Both intermittent high and continual low exposures to insoluble forms of beryllium can create and maintain a lung burden that will not clear for many years, if at all (ref. 27).

Certain individuals are more susceptible to CBD than others. It has long been suspected that genetic predisposition plays an important role in determining who will develop CBD. Recent advances in genetics and immunology have made it possible for researchers to investigate the basis for CBD and to identify a genetic component (ref. 28).

Differences in individual susceptibility have made it difficult to understand the relationship between exposure and CBD. Early epidemiology studies detected similar disease rates among high- and low-exposure occupational groups (Table 6). The NJMRC researchers detected differences in disease rates among the workers they studied (Table 7). The DOE surveillance findings supported this conclusion (See Table 5). NJMRC researchers have found cases of CBD among those who had been exposed for periods as short as one month and those who had unrecognized or seemingly trivial exposure. However, the NJMRC also found evidence that disease incidence increased with increasing exposure and concluded that exposure to beryllium should be minimized.

TABLE 6.—CHRONIC BERYLLIUM DISEASE RATES

Exposed during the 1940s	Estimated exposed	Cases	Estimated incidence per 100 exposed	Estimated level of exposure $\mu g/m^3$
Residents Living Within 0.25 Mile of a Beryllium Extraction Plant [1]	500	5	1.0	1
Fluorescent Lamp Manufacturing: [1]				
Massachusetts	15,000	175	1.16	100
Ohio	8,000	32	0.4	100
Machine Shop [1]	225	11	4.9	500
Beryllium-Copper Foundry [1]	1,000	13	1.3	500
Beryllium Extraction: [1]				
Lorain, Ohio	1,700	22	1.3	1,000
Painesville, Ohio	200	0	0.0	1,000
Reading, Pennsylvania	4,000	51	1.3	1,000
Exposed from the 1970s to the 1980s	**Study participants**	**Cases**	**Incidence per 100 exposed**	**Estimated level of exposure $\mu g/m^3$**
Beryllia Ceramics Plant [2]	505	9	1.8	NA
The DOE Rocky Flats Plant [3]	895	15	1.7	1
Second Beryllia Ceramics Plant [4]	709	8	1.1	0.5

[1] Eisenbud and Lisson, "Epidemiologic Aspects of Beryllium-Induced Non Malignant Lung Disease: A 30-Year Update," JOM, Vol. 25, pp 196–202, 1983.
[2] Kathleen Kreiss et al., "Beryllium Disease Screening in the Ceramics Industry," JOM, Vol. 35, pp 267–274, 1993.
[3] Kathleen Kreiss et al., "Epidemiology of Beryllium Sensitization and Disease in Nuclear Workers," Am. Rev. Res. Dis., Vol. 148, pp 985–991, 1993.
[4] Kathleen Kreiss et al., "Machining Risk of Beryllium Disease and Sensitization with Median Exposures Below 2 $\mu g/m^3$," Am. J. Ind. Med., Vol. 30, pp 16–25, 1996.

TABLE 7.—BERYLLIUM SENSITIZATION AND DISEASE RATES AT ROCKY FLATS [1]

Beryllium process title	Workers sensitized	Workers doing process	Sensitization rate (percent)
Cleaning Tools, Machines	7	255	2.7
Machining	6	189	3.2
Inspection	2	138	1.4
Metallurgical Sample Preparation	3	115	2.6
Sawing	5	6	4.7
Trepanning	3	77	3.9
Band Sawing	4	67	6.0

TABLE 7.—BERYLLIUM SENSITIZATION AND DISEASE RATES AT ROCKY FLATS [1]—Continued

Beryllium process title	Workers sensitized	Workers doing process	Sensitization rate (percent)
Decanning, Shearing	2	65	3.1
Precision Grinding	2	31	6.5
All participants	**Number**	**Participants**	**Rate (percent)**
Sensitized	18	895	2.0
Confirmed CBD Cases	15	895	1.7

[1] Kathleen Kreiss et al. "Epidemiology of Beryllium Sensitization and Disease in Nuclear Workers," Am. Rev. Res. Dis., Vol. 148, pp 985–991, 1993.

A recent publication by Eisenbud in January 1998 (ref. 29) consolidated the previous epidemiology studies that have questioned the relevance of the current PEL after evaluating the effect of the level of exposure on disease. In this article, Eisenbud concludes that it "appears" the current 2 $\mu g/m^3$ standard is not protective enough. Rather than recommend an alternative exposure limit, however, Eisenbud points to the need for the development of an animal model to aid in better understanding the etiology of CBD and suggests that innovative measures may be needed to control the disease.

In summary, evidence suggests higher incidence of CBD among workers with higher exposures (e.g., machinists), but, at lower exposure levels, other factors may operate to confound a clear dose-response relationship. These factors include: (1) the effect of peak exposures (such that most of the exposure results from short-term episodes; (2) the inadequacy of area monitoring in reflecting actual exposure; (3) the effect of chemical composition, size, and shape on the bioavailability of the inhaled particles; (4) inadequate monitoring of the chemical beryllium composition, size, and shape of inhaled particles; and (5) the effect of genetic predisposition on developing beryllium sensitization and CBD. As a result, the existing literature does not point to a specific tolerance level for exposure to beryllium.

4. Value of Early Detection

Early detection of a disease is of value if it leads to earlier treatment and a better prognosis for the individual being tested. Screening for CBD with the Be-LPT can provide earlier detection than is possible with other tests. In some cases this has led to treatment of CBD to reduce lung damage that would not have been possible if the CBD remained undiagnosed by other tests, such as chest X-ray. Researchers at the NJMRC compared the lung functions of patients with CBD who had been identified through abnormal chest X-rays or clinical symptoms to those of patients whose CBD had been identified through positive Be-LPTs (ref. 30). Twelve out of 21 Be-LPT-identified patients had lung abnormalities, including reduced exercise tolerance. Fourteen of 15 patients identified through chest X-rays or clinical symptoms had abnormal lung function, and their abnormalities were more severe. The authors concluded that the Be-LPT was useful because it permitted detection of affected individuals earlier in the disease process.

DOE's experience is consistent with this conclusion. The 79 cases of CBD diagnosed among Rocky Flats workers showed a range of severity. Thirty-nine individuals had symptoms that required treatment ranging from inhaled bronchodilators to corticosteroids to oxygen. Two individuals died of CBD. Seventy-three of the 79 cases were identified among individuals who had abnormal Be-LPT results but normal chest X-rays or pulmonary function screening test results. Clinical evaluations using computer aided tomography (CAT) scan, bronchoalveolar lavage-BeLPT (BAL Be-LPT), transbronchial biopsy, and gas diffusion studies of workers confirmed the presence of CBD in these workers.

There is no direct evidence that removal from exposure improves the prognosis of patients with CBD, because follow-up studies have not been done. However, beryllium does clear from the lung over time, and a reduced level of antigen in the lung should reduce the severity of the inflammation and the amount of lung damage (ref. 27). Additionally, members of the work force who are consistently positive on the Be-LPT are those most likely to eventually develop CBD. Treating physicians generally recommend that these individuals receive more frequent and more extensive pulmonary function testing so that the lung damage associated with CBD can be minimized through early detection and treatment. Sensitized and early CBD patients can be removed from jobs with beryllium exposure.

Finally, beryllium sensitization found through screening with the Be-LPT is the earliest indication that working conditions and work practices are affecting the health of exposed workers. This allows for an earlier opportunity to initiate corrective actions and possibly to prevent cases of CBD. Early detection enhances the contribution of medical surveillance to the management of the CBDPP.

II. Legal Authority and Relationship to Other Programs

Today's rule, which establishes minimum requirements for the protection of beryllium-associated workers, is promulgated pursuant to DOE's authority under section 161 of the Atomic Energy Act of 1954 (AEA) to prescribe such regulations as it deems necessary to govern any activity authorized by the AEA, specifically including standards for the protection of health and minimization of danger to life or property (42 U.S.C. 2201(i)(3) and (p)). Additional authority for the rule, insofar as it applies to DOE Federal employees, is found in section 19 of the Occupational Safety and Health Act of 1970 (29 U.S.C. 668) and Executive Order 12196, "Occupational Safety and Health Programs for Federal Employees," (5 U.S.C. 7902 note), which require Federal agencies to establish comprehensive occupational safety and health programs for their employees.

DOE intends this final rule to be integrated with the existing worker protection management program for DOE Federal and contractor employees established by DOE Order 440.1A. The requirements in this final rule will supersede any conflicting provisions of DOE Order 440.1A on the effective date of the rule. On that date the rule also

will supersede DOE Notice 440.1, "Interim Chronic Beryllium Disease Prevention Program," established by then-Secretary Pena on July 15, 1997.

Some comments on the NOPR raised questions about the effect of the rule on collective bargaining and grievance-arbitration processes established by collective bargaining agreements. One union urged (Ex. 22) DOE to clarify whether the terms of this rule are subject to negotiation between a union and a contractor.

DOE has concluded that there is a compelling need for the CBDPP requirements in this final rule in order for DOE to meet its obligation under the AEA to protect the health of its employees and other workers at DOE facilities. The regulatory requirements of this rule will by operation of law apply to DOE contracts. Therefore, the application and enforcement of this rule are not subject to the Work Smart Standards Program or other related processes. DOE believes that this mandatory application of the CBDPP requirements to all DOE beryllium activities is appropriate given the hazardous nature of beryllium-related work.

While the minimum requirements in the rule are non-negotiable and may not be waived, the rule does not preclude all collective bargaining on matters related to beryllium exposure protections. Some rule provisions, such as the requirement for a beryllium exposure reduction and minimization provision in an employer's CBDPP, are performance-based and allow for negotiation between the employer and employee representatives. Other rule requirements, however, are stated in specific terms that do not permit any change. For example, section 850.24(e) of the rule specifies the accuracy that must be achieved by exposure monitoring of workers: not less than plus or minus 25 percent, with a confidence level of 95 percent, for airborne concentrations of beryllium at the action level. DOE's objectives of controlling worker exposure to airborne beryllium and obtaining better exposure data would be defeated if accuracy of monitoring were a subject of collective bargaining. Although today's rule may incidentally affect collective bargaining, it is neutral with respect to the balance of bargaining power of organized labor and management. The rule applies to all DOE contractors whether or not they are involved in collective bargaining.

This final rule is not being promulgated as a nuclear safety requirement under 10 CFR Part 820, Procedural Rules for Nuclear Activities, because beryllium generally is not a nuclear material. Any radiological implications of the two radioisotopic forms of beryllium would be addressed under the provisions of 10 CFR part 835, Occupational Radiation Protection.

III. Overview of the Final Rule

The final rule strengthens the worker protection program established under DOE Order 440.1A, Worker Protection Management for DOE Federal and Contractor Employees (or DOE Orders 5483.1B, 5480.4, 5480.8A, and 5480.10 for operations not covered by DOE Order 440.1A), by supplementing the general worker protection program requirements with provisions that are specifically designed to manage and control beryllium exposure hazards in the DOE workplace. These hazard-specific provisions are derived largely from DOE Notice 440.1, "Interim Chronic Beryllium Disease Prevention Program," but a number of provisions have been modified as a result of DOE's consideration of comments received in the rulemaking.

Consistent with DOE Notice 440.1, this final rule establishes a CBDPP that is designed to reduce the occurrence of CBD among DOE federal and contractor workers and any other individuals who perform work at DOE facilities. The CBDPP will accomplish this disease-reduction mission through provisions that: (1) Reduce the number of current workers who are exposed to beryllium by clearly identifying and limiting worker access to areas and operations that contain or utilize beryllium; (2) minimize the potential for, and levels of, worker exposure to beryllium by implementing engineering and work practice controls that prevent the release of beryllium into the workplace atmosphere and/or capture and contain airborne beryllium particles before worker inhalation; (3) establish medical surveillance to monitor the health of exposed workers and ensure early detection that makes possible early treatment of disease; and (4) establish continual monitoring of the effectiveness of the program in preventing CBD and implementing program enhancements as appropriate. Another key purpose of the rule is the collection of consistent data, which will improve the information available to better understand the cause of CBD.

DOE has made numerous changes in the final rule after considering the public comments on the proposed rule. The principal changes are as follows:

- The final rule requires responsible employers to assign a qualified individual, such as a Certified Industrial Hygienist, to manage and supervise beryllium inventories, hazard assessments, and exposure monitoring.

- The final rule establishes the airborne beryllium concentration action level, which in this rule triggers key worker protection measures, at 0.2 $\mu g/m^3$, instead of 0.5 $\mu g/m^3$ as proposed. The STEL has been deleted, because the proposed STEL would not provide any added protection for workers given that the new action level of 0.2 $\mu g/m^3$ would be exceeded in less than 15 minutes where exposure levels are at 10$\mu g/m^3$.

- The final rule provides that responsible employers must require workers to use respirators in areas where the beryllium exposure level is at or above the action level, rather than at or above the PEL as proposed in the NOPR, and must provide a respirator to any worker exposed to beryllium who requests one, regardless of the concentration of airborne beryllium.

- The final rule includes criteria and requirements to govern the release of beryllium-contaminated equipment and other items at DOE sites for use by other DOE facilities or the public.

- The final rule requires responsible employers to offer medical surveillance to any "beryllium-associated worker," defined to include any current worker who is exposed through beryllium work or who had past exposure or potential exposure to beryllium at a DOE facility.

- The final rule contains medical removal protection and multiple physician review provisions that are modeled on provisions of three of OSHA's expanded health standards.

The provisions of the rule are presented in three subparts. Subpart A describes the purpose and applicability of the rule, defines terms that are critical to the rule's application and implementation, and establishes DOE and contractor responsibilities for executing the rule. Subpart B establishes administrative provisions requiring responsible employers to develop and maintain a CBDPP and to perform all beryllium-related activities according to the CBDPP. Subpart C establishes requirements for the content and implementation of the CBDPP. Some of the provisions of Subpart C apply only when it is determined that the airborne concentration of beryllium in a specific workplace or operation rises above a specified limit. Table 8 summarizes these provisions and indicates the levels of beryllium at which the provisions apply.

TABLE 8.—LEVELS AT WHICH THE PROVISIONS OF THE CBDPP APPLY

Provision	Worker exposure or potential exposure levels (8–Hour TWA)		
	Be operations/locations [1]	≥Action level (0.2 μg/m³)	≥PEL (8-hr TWA) (2.0 μg/m³)
Baseline Inventory (850.20)	X		
Hazard Assessment (850.21)	X		
Initial Exposure Monitoring (850.24)	X		
Periodic Exposure Monitoring (850.24)		X	
Exposure Reduction and Minimization (850.25)	X [2]	X [3]	X [4]
Regulated Areas (850.26)		X	
Hygiene Facilities and Practices (850.27)		X	
Respiratory Protection (850.28)	X [5]	X	
Protective Clothing and Equipment (850.29)	X [6]	X	
Housekeeping (850.30)	X [7]		
Release Criteria (850.31)	X [8,9]		
Medical Surveillance (850.34)	X [10]		
Training and Counseling (850.37)	X [11]		
Warning Signs (850.38)		X	

[1] Applies to beryllium operations and other locations where there is a potential for beryllium contamination.
[2] Responsible employers must implement actions for reducing and minimizing exposures, if practicable.
[3] Responsible employers must establish a formal exposure reduction and minimization program, if practicable.
[4] Responsible employers must reduce exposures to or below the PEL.
[5] Responsible employers must provide respirators when requested by the worker.
[6] Responsible employers must provide protective clothing and equipment where surface contamination levels are above 3 μg/100 cm².
[7] Housekeeping efforts must maintain removable surface contamination at or below 3 μg/100 cm² during non-operational hours.
[8] Removable contamination on equipment surfaces must not exceed 0.2 μg/100 cm² when released to the public or for non-beryllium use.
[9] Removable contamination on equipment surfaces must not exceed 3 μg/100 cm² when released to other beryllium handling facilities.
[10] Responsible employers must provide medical surveillance for all beryllium-associated workers.
[11] Training is required for all workers who could be potentially exposed. Counseling is required for beryllium-associated workers diagnosed with CBD or beryllium sensitization.

IV. Section-by-Section Discussion of Comments and Rule Provisions

This section of the Supplementary Information responds to significant comments on specific proposed rule provisions. It also contains explanatory material for some final rule provisions in order to provide interpretive guidance to DOE offices and DOE contractors that must comply with this rule. All substantive changes from the notice of proposed rulemaking (NOPR) are explained in this section. However, some non-substantive changes, such as the renumbering of paragraphs and changes to clarify the meaning of rule provisions, are not discussed.

DOE has determined that the requirements set forth in this final rule are those which, based on currently available data, are necessary to provide protection to workers who may be exposed to beryllium.

A. Subpart A—General Provisions

Section 850.1—Scope

The CBDPP required by this rule will enhance, supplement, and be integrated into existing worker protection program requirements for DOE Federal and contractor employees. DOE has structured the rule this way for two main reasons: (1) to take advantage of existing and effective comprehensive worker protection programs that have been implemented at DOE facilities; and (2) to minimize the burden on DOE contractors by clarifying that contractors need not establish redundant worker protection programs to protect workers from hazards of exposure to airborne beryllium.

Section 850.2—Applicability

As in the proposed rule, section 850.2 specifies that this rule applies to DOE offices and DOE contractors with responsibility for operations or activities that involve present or past exposure, or the potential for exposure, to beryllium at DOE facilities. It also applies to any current DOE employee, DOE contractor employee, or any other current worker at a DOE facility who is or was exposed or potentially exposed to beryllium at a DOE facility, regardless of which organization currently employs the worker.

Except at the few DOE-operated facilities, DOE federal workers are not usually directly involved in production tasks or other activities in which they would be exposed to airborne beryllium. However, in performing management and oversight duties, DOE federal workers may enter facilities where beryllium is handled. Federal agencies are required to ensure the protection of federal workers under the health and safety provisions of 29 CFR Part 1960, "Basic Program Elements for Federal Employee Occupational Safety and Health Programs and Related Matters," as well as Executive Order (EO) 12196, "Occupational Safety and Health Programs for Federal Employees." DOE's intent in section 850.2(a)(1) is to supplement these general worker protection requirements with specific beryllium-related requirements in the limited instances where DOE federal workers may have the potential for beryllium exposure.

Section 850.2(a)(2) specifies that the rule also applies to DOE contractors with operations or activities involving exposure or the potential for exposure to beryllium. As clarified in the definition of "DOE contractor" (section 850.3), DOE's intent is that the contractors covered under this rule include any entity under contract to perform DOE activities at DOE-owned or -leased facilities, including contractors awarded management and operating contracts, integrating contractors, and subcontractors. This section further clarifies that the requirements of the CBDPP apply only to contractors and subcontractors who work in areas or on DOE activities that involve the potential for worker exposure to beryllium.

The provisions of this rule do not apply to former DOE workers; to activities at DOE facilities that do not involve exposure or potential exposure to beryllium; or to activities not

conducted at a DOE facility, such as the off-site laundering of beryllium-contaminated protective clothing from a DOE site.

Section 850.2(b) exempts "beryllium articles" from the rule (see the definition of "beryllium article" under section 850.3). DOE recognizes that some beryllium-containing manufactured items may not pose beryllium hazards where they have been formed to specific shapes or designs and their subsequent uses or handling will not result in the release of airborne beryllium. This exemption for beryllium articles is consistent with the approach taken by OSHA in regulating hazardous materials under the Hazard Communication standard at 29 CFR 1910.1200.

Section 850.2(c) establishes that the rule does not apply to the DOE laboratory operations involving beryllium that are subject to the requirements of OSHA's Occupational Exposure to Hazardous Chemicals in Laboratories standard, 29 CFR 1910.1450, commonly called OSHA's Laboratory standard. Three commenters (Exs. 30, 31, 32) opposed this exemption, stating that lesser protection would be afforded to laboratory workers than to those workers covered by the rule. One commenter (Ex. 30) suggested that laboratory exposures are difficult to predict and that a lack of sampling resulting from the perception that little hazard is present in laboratory settings may lead to incomplete exposure characterizations.

In establishing its Laboratory standard, OSHA clarified its intent that 29 CFR 1910.1450 supersede all other OSHA regulations for bench-top laboratory-scale activities, noting that the provisions of the standard were more relevant and suitable to the unique characteristics of laboratory activities. DOE agrees with OSHA's approach and believes that the provisions of OSHA's Laboratory standard are adequate to protect workers from beryllium exposures in facilities that fall within the scope of the standard.

DOE notes the laboratory exemption only applies in instances where relatively small quantities of beryllium are used in a non-production activity. In addition, OSHA's Laboratory standard has specific provisions to ensure that protective laboratory practices are followed. Many of the provisions in OSHA's Laboratory standard are the same as, or similar to, those in this final rule. For instance, OSHA's Laboratory standard establishes provisions for identifying the presence of hazardous chemicals (baseline inventory), establishing a chemical hygiene plan (hazard assessment), performing periodic monitoring at the action level, implementing exposure reduction measures at the PEL, training employees on related hazards, and providing employees the opportunity for medical consultation and examination. In part because each of these aspects of the beryllium rule is already included in the OSHA Laboratory standard, DOE has retained the laboratory operations exemption in section 850.2(b)(2).

Section 850.3—Definitions

Commenters on the proposed rule's "Definitions" section typically requested clarification or modification of the proposed definitions.

New terms. In response to public comment, the following additional terms have been defined in section 850.3: "beryllium-associated worker," "Head of DOE Field Element," "removable contamination," "responsible employer," and "unique identifier." A discussion of each term is included in the alphabetical listing of definitions provided below.

Terms and definitions deleted. In response to public comment, the following definitions in the NOPR are deleted in the final rule: "accepted applicant," "short term exposure limit (STEL)," and "surface contamination." The deletions are explained in the section-by-section discussion of the rule provisions in which the terms were previously used.

Section 850.3 defines key terms using traditional industrial hygiene terminology and terminology used by OSHA in its regulations. The use of such terminology is consistent with DOE's increased emphasis on industrial hygiene compliance through the use of accepted occupational safety and health requirements and procedures. The following discussion explains the definitions in the rule. Although some of these terms are commonly used, DOE believes that these definitions will help ensure that their meaning as used in the context of the rule is clear.

Action level means the level of airborne concentration of beryllium established pursuant to Subpart C, which, if met or exceeded, requires the implementation of certain specified provisions of the rule. Using an action level to trigger certain provisions of the rule is consistent with the approach applied in many of OSHA's substance-specific standards. The word "exceeded" was amended to read "met or exceeded" in the final rule to clarify DOE's intent that worker protection provisions must be implemented in cases where worker exposure levels are measured at, as well as above, the action level.

Authorized person means any person required by work duties to be in regulated areas. The concept of authorized person is consistent with OSHA standards and with contractor practice in many DOE facilities, and is intended to ensure that the population of potentially exposed individuals is reduced to the lowest possible number and that workers who are granted access to regulated areas have the knowledge they need to protect themselves and other workers. Under this rule, authorized individuals are to be trained in the hazards of beryllium and in the means of protecting themselves and those around them against such hazards. Training requirements for individuals working with beryllium are specified in section 850.37 of the rule. DOE did not receive any comments on this definition, which remains unchanged in the final rule.

Beryllium means elemental beryllium and any insoluble beryllium compound or alloy containing 0.1 percent beryllium or greater that may be released as an airborne particulate. This definition of beryllium reflects the focus of this rule on worker exposure to airborne beryllium. One commenter (Ex. 26) questioned whether exposure to naturally occurring beryllium compounds in excess of 0.1 percent was covered by the DOE program. However, as correctly noted by the same commenter, sections 850.2(a)(1) and (2) provide that the rule only applies to exposures and potential exposures to beryllium that occur in connection with facility operations. Another commenter (Ex. 10) suggested that 0.1 percent beryllium was too inclusive, and suggested that a level of 0.5 percent be used instead. DOE notes, however, that the concentration specified in the definition is consistent with the criterion that OSHA uses for a carcinogenic mixture, i.e., one that contains a carcinogenic component at a concentration of 0.1 percent (or 1,000 parts per million [ppm]) or greater, by weight or volume. Therefore, DOE has not changed the definition in the final rule.

Beryllium activity means an activity performed for, or by, DOE at a DOE facility that can expose workers to airborne concentrations of beryllium. Activities within the scope of this definition may involve design, construction, operation, maintenance, and decommissioning. The definition further explains that a "beryllium activity" may involve one DOE facility or operation, or a combination of facilities and operations. This definition

is broad enough to include activities such as repair work performed by support-service subcontractors who visit the site infrequently. DOE did not receive comments on this proposed definition. However, DOE modified the language to clarify that maintenance operations are within the scope of the term.

Beryllium article means a manufactured item that is formed to a specific shape or design during manufacture, that has end-use functions that depend in whole or in part on the item's shape or design, and that does not release beryllium or otherwise result in exposure to airborne concentrations of beryllium under normal use conditions. DOE has included this definition of "beryllium article" to distinguish between forms of beryllium that may result in exposure to airborne beryllium and manufactured items containing beryllium that do not release beryllium or otherwise result in exposure to airborne concentrations of beryllium. All of the persons (Exs. 9, 26, 30, 31) commenting on this definition agreed that exempting beryllium articles from the program is a logical approach. Two of these commenters (Exs. 9, 26) stated that an item destined for machining should be considered a beryllium article up to the time of that machining. In response to these comments DOE notes that the beryllium article definition is consistent with the approach employed by OSHA in formulating its definition of "article" in the Hazard Communication standard (29 CFR 1910.1200). The key concept is that an article, if used as intended, does not have the potential to result in hazardous exposures. However, an item ceases to be an "article" when it is subjected to machining, cutting, drilling, or similar action other than its intended end use. Similarly, if an item is manufactured for the purpose of being machined later, it is not considered an article. Another commenter (Ex. 31) suggested that examples of activities that could release beryllium, such as burning, grinding and chipping, be included in a parenthetical listing in the definition. DOE recognizes that there are many activities that could lead to a release, and is concerned that providing examples could be interpreted to exclude other activities. To avoid such confusion, DOE believes that examples should not be included in the definition, but rather should be included in a companion implementation guide for the rule.

Beryllium-associated worker means a current worker who is or was exposed or potentially exposed to airborne concentrations of beryllium at a DOE facility. This individual may be a DOE Federal or contractor worker, an employee of a subcontractor to a DOE contractor, or a visitor who, pursuant to a DOE-approved arrangement, performs work at a DOE facility. This definition clarifies DOE's intent that the rule applies only to current workers. The definition further clarifies that current workers who have been removed from beryllium exposure as part of the medical removal plan are beryllium-associated workers under the rule, but they are not "beryllium workers" (see definition of "beryllium worker").

Beryllium emergency means any occurrence such as, but not limited to, equipment failure, container rupture, or failure of control equipment or operations, that unexpectedly releases a significant amount of beryllium. This definition is particularly important when determining appropriate emergency response procedures that fall within the scope of OSHA's Hazardous Waste Operations and Emergency Response standard, 29 CFR 1910.120. This definition is based on OSHA's interpretation of the term "emergency" as applied in 29 CFR 1910.120 and refers to any untoward event, such as a major spill of powdered beryllium or an unexpected upset that releases a significant amount of beryllium into the workplace atmosphere. Two commenters (Exs. 24, 31) expressed concern that the term "significant release" was open to too much interpretation and needed further clarification. Emergency situations, by their very nature, are difficult to anticipate and describe. DOE believes that the examples listed provide a general indication as to what constitutes a significant release. The use of the term "beryllium emergency" is used in section 850.33, which requires DOE contractors to develop emergency procedures and training to address emergency scenarios.

Beryllium-induced lymphocyte proliferation test (Be-LPT) means an *in vitro* measure of the beryllium antigen-specific, cell-mediated immune response. This test measures the extent to which lymphocytes, a class of white blood cells, respond to the presence of beryllium by replicating in the laboratory. Medical personnel use the Be-LPT to identify workers who have become sensitized to beryllium through their occupational exposure. DOE did not receive any comments on this proposed definition, which remains unchanged in the final rule.

Beryllium worker means a current worker who is regularly employed in a DOE beryllium activity. Section 850.3 of the NOPR defined "beryllium worker" as "a current worker who is exposed or potentially exposed to airborne concentrations of beryllium at or above the action level or above the STEL or who is currently receiving medical removal protection benefits." This proposed definition included DOE Federal or contractor workers, workers employed by a subcontractor to a DOE contractor and visitors performing work at DOE facilities. Consistent with other provisions of the proposed rule, DOE intended this definition to apply only to current workers. DOE specifically stated in the NOPR that former workers would not be included in the proposed "beryllium worker" definition, but instead would be addressed under a separate initiative.

DOE received eight comments on the definition of "beryllium worker" in the proposed rule. Five commenters (Exs. 2, 14, 16, 17, 28) stated that the term beryllium worker was too limiting. These commenters argued that the proposed definition of beryllium worker should not be limited to those workers exposed to levels of beryllium at or above the action level, but rather should include all workers with the potential for beryllium exposure. Three commenters (Exs. 2, 14, 28) supported this position by noting that current scientific evidence does not suggest a "safe" level of beryllium exposure, and that CBD has been identified in individuals thought to have only low or incidental exposure to beryllium. DOE shares this concern, and has omitted the reference to the action level from the definition of "beryllium worker" in the final rule. DOE has revised the definition in the final rule to apply to each "current worker who is regularly employed in a DOE beryllium activity."

These same five commenters (Exs. 2, 14, 16, 17, 28) also argued that medical surveillance should be offered to all individuals with beryllium exposure and that the beryllium worker definition, therefore, should be expanded to include reassigned and former workers with prior beryllium exposure. These commenters were concerned that restricting medical surveillance to "beryllium-workers," as defined in section 850.3 of the proposed rule, would exclude workers with incidental beryllium exposure who also may be at risk of contracting CBD.

Two commenters (Exs. 2, 28) questioned the need for separate medical surveillance programs for former and current beryllium workers. These two commenters raised the issues of increased cost, lack of continuity, and the added confusion to participants associated with maintaining separate surveillance programs.

In response to these comments, DOE added the term "beryllium-associated worker," which is more inclusive than the term "beryllium worker." (See definition of "beryllium-associated worker.") The term "beryllium-associated worker" is used in provisions of the rule where DOE has determined that coverage should not be limited to workers regularly employed in DOE beryllium activities. Use of the term "beryllium-associated worker" clarifies DOE's intent that current employees with past beryllium exposures or potential exposures, as well as current individuals who are exposed to airborne beryllium at DOE facilities, be included under the following rule provisions: 850.5 (dispute resolution), 850.10 (development and approval of the CBDPP), 850.33 (medical surveillance), 850.34 (medical removal), 850.35 (medical consent), 850.36 (training and counseling) and 850.39 (beryllium registry).

DOE, however, has not expanded the definition to include former workers. DOE previously established the Former Beryllium Workers Medical Surveillance Program and offers medical examinations to former (retired and separated) workers who are at risk for developing CBD due to their work at DOE. The elements of the Former Beryllium Workers Medical Surveillance Program are: (1) identification of beryllium workers who have retired or separated from employment; (2) notifying workers of their eligibility to participate in the program, and general announcements to provide former workers an opportunity to self-identify as a former beryllium worker; (3) informed consent on the risks and benefits of participating in the program; (4) screening for CBD using the Be-LPT, a standardized questionnaire on respiratory symptoms, and a chest radiograph if indicated by responses to the questionnaire; (5) an offer of diagnostic medical examinations to individuals found to have either a positive Be-LPT or signs or symptoms of CBD; (6) periodic medical monitoring; (7) funds for medical care that is not covered by insurance; and (8) epidemiologic surveillance to identify high risk operations where additional primary preventative actions are needed.

One commenter (Ex. 23) took issue with the phrase "potentially exposed" in the proposed definition of "beryllium worker," arguing that it is too vague and could allow too much room for individual interpretation. DOE believes that limiting the definition to workers with actual personal exposure monitoring results at or above a specified airborne level would unnecessarily limit responsible employers' options for meeting the exposure monitoring requirements of this rule. For instance, if the phrase "potentially exposed" were removed from the definition, the use of representative sampling would no longer be an acceptable option for meeting the exposure monitoring requirements in the rule. Employers would be required to determine actual exposures for all workers to determine whether the workers are beryllium-associated workers. DOE believes that such an inflexible requirement would be burdensome and inconsistent with sound industrial hygiene practices and the provisions of section 850.21 of the rule, which requires qualified industrial hygienists to apply their professional knowledge and experience in the performance of beryllium hazard assessments. Accordingly, the final rule (in the definitions of "beryllium-associated worker" and "beryllium activity") requires responsible employers to consider potential exposures in identifying beryllium workers.

Another commenter (Ex.16) stated that the proposed definition of "beryllium worker," as applied in determining a worker's eligibility to participate in the medical surveillance program, could be too narrow in some respects and too broad in others. This commenter favored including current workers no longer working with beryllium and those with exposures below the action level in the definition of "beryllium worker." This commenter recommended allowing the industrial hygiene and medical staff to use a "graded approach" to determine which workers received medical surveillance, based on the needs of the individual and "common sense judgement about cost and benefit." DOE agrees that current workers no longer working with beryllium and those with exposures below the action level should be eligible for medical surveillance and, thus, has included such individuals in the final rule's definition of "beryllium-associated workers." DOE does not agree, however, that determining whether a worker should receive medical surveillance should be left to the discretion of the industrial hygiene and medical staff. DOE believes that such discretionary application of medical surveillance will result in an inconsistent level of protection for workers across the DOE complex. Therefore, section 850.34 of the final rule requires responsible employers to develop and implement a medical surveillance program for all beryllium-associated workers (see discussion of section 850.34).

Breathing zone is the hemisphere forward of the shoulders, centered on the mouth and nose, with a radius of 6 to 9 inches. This definition is used principally in section 850.24, Exposure Monitoring, which requires DOE contractors to determine worker exposures to beryllium by monitoring for the presence of contaminants in the worker's personal breathing zone. One commenter (Ex. 9) stated that this proposed definition was imprecise. DOE disagrees and views this definition as being consistent with sound and accepted industrial hygiene practice. It will ensure that samples collected for personal exposure monitoring represent the air inhaled by workers while performing their duties in affected work areas. Therefore, DOE has not revised this definition in the final rule.

DOE means the Department of Energy.

DOE contractor means any entity under contract with DOE, including a subcontractor, with responsibility for performing DOE activities at DOE-owned or -leased facilities. This term does not apply to a contractor or subcontractor who provides only "commercial items" as defined under the Federal Acquisition Regulations (FAR). Such contractors would not be performing DOE beryllium activities. As explained in the discussion of section 850.10, subcontractors who are covered under the rule normally will not be designated to prepare the written CBDPP for a site. However, these subcontractors will be included in the CBDPP that encompasses all beryllium-related activities at the site.

DOE facility means any facility operated by or for DOE, whether owned or leased by DOE.

Head of DOE Field Element is the high-level DOE official in a DOE field or operations office who has the responsibility for identifying the contractors and subcontractors covered by this part and for ensuring compliance with this part.

High-efficiency particulate air (HEPA) filter means a high-efficiency filter capable of trapping and retaining at least 99.97 percent of 0.3-micrometer monodisperse particles. Such filters are commonly used in heating and ventilating systems, respiratory protection equipment, local exhaust ventilation, etc., to remove toxic or hazardous particulates like beryllium.

Immune response refers to the series of cellular events by which the immune system reacts to a specific antigen. Types of immune responses include acquired immunity and sensitization.

The body's immune response to beryllium is sensitization and is indicated by the results of the Be-LPT.

Medical removal protection benefits are employment rights established in section 850.35 for beryllium-associated workers temporarily or permanently subject to medical removal from working in regulated areas following medical evaluations. These provisions give contractors an incentive to make reasonable efforts to find and offer alternate employment to workers who have suffered negative health effects due to exposure to beryllium. The definition of medical removal protection benefits and the requirements in section 850.35 ensure that such workers would suffer no reductions in total earnings, seniority, or other worker rights and benefits for two years after permanent medical removal. The two-year period for medical removal protection benefits after permanent removal will allow the contractor to make a reasonable effort to find alternate employment for a removed worker or, through job retraining and out-placement programs operated by many sites, to locate alternate outside employment for the worker.

Regulated area means an area demarcated and managed by the responsible employer where the airborne concentration of beryllium exceeds, or can reasonably be expected to exceed, the action level (see the definition of "action level."). Employees working in regulated areas must be authorized to do so by the responsible employer, and must be trained and equipped with protective clothing and equipment. The purpose of such areas is to limit potential exposure to beryllium to as few workers as possible. Regulated areas are commonly used throughout DOE, particularly with regard to radiation protection, and their use is consistent with OSHA's expanded health standards for toxic particulates.

Removable contamination means beryllium contamination that can be removed from surfaces by nondestructive means, such as casual contact, wiping, brushing, or washing. This term was adopted from DOE's Radiological Control Manual, April 1994. One commenter (Ex. 23) stated that "surface contamination", a term defined in the proposed rule, should refer to contamination that is removable, not simply beryllium on surfaces. DOE agrees with this commenter that only removable surface contamination can become airborne and inhaled by workers, and has replaced the term "surface contamination" with "removable contamination."

Responsible employer means the DOE contractor office that is directly responsible for the safety and health of DOE contractor employees while performing a beryllium activity or other activity at a DOE facility; or for DOE employees, the DOE office that is directly responsible for the safety and health of DOE Federal employees while performing a beryllium activity or other activity at a DOE facility; and any person acting directly or indirectly for such office with respect to terms and conditions of employment of beryllium-associated workers. This definition is added to clarify DOE's intent that provisions of the final rule apply to both DOE Federal and contractor workers at DOE facilities.

Site Occupational Medical Director (SOMD) means the physician responsible for the overall direction and operation of the site occupational medicine program. DOE intends, through this definition, to ensure that a physician administers each DOE facility's occupational medicine program.

Unique identifier means a number or alphanumeric code used to identify each worker individually and distinctively while protecting the worker's privacy. Unique identifiers are used in DOE's health surveillance program to help identify the exposures each worker has experienced in the course of his or her work in a DOE facility without personally identifying the worker. The unique identifiers will allow DOE to link worker's exposure and occupational health data.

Worker means a person who performs work at a DOE facility including (but not limited to) a DOE employee, an independent contractor, or a DOE contractor employee. As clarified in the definition of "DOE contractor," an employee of a covered subcontractor is a contractor employee under this part.

Worker exposure means the airborne concentration of beryllium in the breathing zone of the worker that would occur if the worker were not using respiratory protective equipment. This definition is consistent with accepted industrial hygiene practice and with OSHA's definition of the term "employee exposure" as applied in the OSHA expanded health standards.

Section 850.4–Enforcement

DOE proposed that enforcement of the CBDPP requirements in Part 850 would be through contractual remedies, including contract termination or reduction in fee. Section 850.4 of the final rule adheres to this approach. This section provides that DOE may take appropriate steps under its contracts to ensure compliance with this rule, including (but not limited to) contract termination or reduction in fee.

One union commented (Ex. 22) that the proposed enforcement provision would be inadequate because DOE is not likely to terminate a prime contractor's contract for failure to comply with health and safety requirements, and because award fee reductions are only useful if the contracting officer is aware of, and qualified to investigate, noncompliance. The union requested that the rule be enforced under DOE's nuclear safety requirement enforcement procedures in 10 CFR Part 820 or pursuant to section 3131 of the National Defense Authorization Act for Fiscal Years 1992 and 1993 (42 U.S.C. 7274d). The union also suggested that while awaiting a compliance officer, a worker should have the right to shut down the job without loss of pay.

DOE has not adopted the commenter's recommendation to enforce this rule under 10 CFR Part 820 or section 3131 of the National Defense Authorization Act for Fiscal Years 1992 and 1993. Part 820, "Procedural Rules For DOE Nuclear Activities," contains procedures for enforcement of DOE nuclear safety requirements. Beryllium is not normally considered a nuclear material, and, therefore, enforcement of this rule would not fall within the scope of Part 820. DOE also cannot enforce this rule under section 3131 of the National Defense Authorization Act because that section's scope is limited, authorizing only the imposition of civil penalties against a DOE contractor for failing to train or certify to DOE the adequacy of employee training in hazardous substance response or emergency response (42 U.S.C. 7274d(b)).

In DOE's view, the existing mechanisms and contractual remedies available for enforcing DOE contractor worker protection programs are adequate for enforcement of this rule. For instance, under DOE Order 440.1A, DOE and, to the extent incorporated into contracts, DOE contractors are required to implement worker protection programs that ensure compliance with applicable health and safety requirements. The worker protection program must provide workers with certain rights, including, among other things, the right to accompany DOE worker protection personnel during workplace inspections on official time; the right to express concerns related to worker protection; to decline to perform an assigned task based on a reasonable belief that the task poses an imminent risk of death or serious bodily harm

when there is insufficient time to obtain redress through normal reporting and abatement procedures; the right to observe monitoring or measuring of hazardous agents and have access to the results of exposure monitoring; the right to be notified if monitoring results indicate they were overexposed to hazardous materials; and the right to receive results of inspections and accident investigations upon request. These provisions of DOE Order 440.1A continue to apply under the CBDPP.

Additionally, a contractor employee is protected from retaliation for a refusal to work under certain circumstances, as specified in an interim final rule that DOE promulgated on March 15, 1999, which substantially revises 10 CFR part 708, DOE Contractor Employee Protection Program (64 FR 12862 as amended at 64 FR 37396). An employee of a contractor (or a subcontractor) may file a complaint under the "whistleblower" regulations if he or she is subject to retaliation for refusing to participate in an activity based on a reasonable fear of serious injury (10 CFR 708.5(c)).

Section 850.5–Dispute Resolution

In the NOPR, DOE proposed that disputes arising under this part that are brought by beryllium workers be resolved through applicable grievance-arbitration processes or, if such processes are not available, through referral to the DOE's Office of Hearings and Appeals.

A union commented (Ex. 22) that the proposal to relegate a worker to the grievance and arbitration provision of the collective bargaining agreement would be inadequate because it erroneously assumes that an arbitrator would find a final rule to be part of the collective bargaining agreement. The union stated that unless DOE required employers to propose this rule, and unions accepted it as a contract condition, an arbitrator would decline to enforce this rule. The same commenter asked that DOE clarify in the final rule that an employee representative may file grievances under a collective bargaining agreement or seek other remedies under the labor laws to compel contractor compliance or deter contractor retaliation for seeking enforcement of the rule.

A DOE contractor (Ex. 23) expressed concern that proposed section 850.5 might interfere with existing dispute resolution processes, or might violate Federal law by imposing an obligation on the employment relationship between a DOE contractor and its employees who are subject to the terms of a collective bargaining agreement.

In proposing section 850.5, DOE sought to avoid creating opportunities for workers represented by labor organizations to circumvent collective bargaining agreement procedures for resolving disputes concerning terms and conditions of employment. Thus, DOE proposed that workers use available grievance-arbitration procedures for resolution of disputes related to the subject of this rule. However, DOE agrees with the comment that an arbitrator deciding a grievance under a collective bargaining agreement might not look beyond the collective bargaining agreement in making a decision. Because this rule establishes minimum requirements that are independent of collective bargaining agreements, available grievance-arbitration procedures may not in some cases be sufficient to ensure compliance with the rule.

DOE, therefore, has modified the text of section 850.5 to permit any adversely affected person to refer a dispute regarding compliance with the rule to the Office of Hearings and Appeals for resolution, but employees who are represented by a labor organization are required first to exhaust any grievance-arbitration procedure that is available for resolving disputes over terms and conditions of employment. This is the approach DOE took in its interim final rule for the DOE Contractor Employee Protection Program, 10 CFR part 708 (64 FR 12862, March 15, 1999). Consistent with section 708.13(a) of the Contractor Employee Protection Program rule, DOE has revised section 850.5 in the final rule to provide that a worker will be deemed to have exhausted all applicable grievance-arbitration procedures if 150 days have passed after the filing of a grievance and a final decision on it has not been issued.

B. Subpart B—Administrative Requirements

Subpart B of the final rule establishes general and administrative requirements to develop, implement, and maintain a CBDPP and to perform all beryllium-related activities according to the CBDPP.

Section 850.10—Development and Approval of CBDPP

Section 850.10 establishes the procedures for the development and approval of the CBDPP. Section 850.10(a)(1) requires a responsible employer in charge of DOE beryllium activities to prepare a CBDPP for its operations and submit the CBDPP to the appropriate Head of DOE Field Element for approval. This section establishes a 90-day time frame from the effective date of the rule for responsible employers' submission of the CBDPP to the appropriate Head of DOE Field Element. DOE is aware of the burden of documentation that can be generated by new programs. However, most responsible employers have already developed CBDPPs in response to DOE Notice 440.1. DOE expects the additional effort required to refine the existing CBDPPs to meet the requirements of the rule will be minimal.

Section 850.10(a)(2) requires that a single CBDPP be submitted to encompass all beryllium-related activities at a site. Because DOE recognizes that one site may encompass multiple contractors and numerous work activities, this section clarifies that the CBDPP for a given site may include specific sections for individual contractors, work tasks, etc. DOE believes that this allowance for a segmented CBDPP structure will minimize the burden associated with the CBDPP update and approval requirements because it allows individual contractors to update and submit for approval only the section of the CBDPP pertaining to their specific activities. If multiple contractors are involved, the DOE contractor designated by the Head of DOE Field Element must take the lead in compiling the overall CBDPP and coordinating the input from various other contractors, subcontractors or work activities. This section further clarifies that in such cases the designated contractor must review and approve the CBDPPs of other contractors engaged at the site before a consolidated CBDPP can be submitted to the Head of DOE Field Element for final review and approval.

One commenter (Ex. 31) stated that the rule did not clearly designate an "ultimate authority" responsible for designating physical areas covered by the rule. DOE notes that in sections 850.20 and 850.21, the responsible employer is assigned the responsibility of developing a baseline beryllium inventory and, where appropriate, conducting a beryllium hazard assessment. The actions effectively determine which areas of the facility are covered by the rule. DOE believes that the responsible employer is the most familiar with activities and operations that occur on a given DOE site and, thus, is best equipped to make this determination through the performance of the baseline beryllium inventory and hazard assessment.

Section 850.10(b) requires Heads of DOE Field Elements to review and approve CBDPPs. DOE believes that its review and approval is necessary to

ensure that each contractor's CBDPP is consistent with the requirements and objectives of this final rule. Through these sections, DOE hopes to establish clear lines of authority for review and approval of contractors' CBDPPs. One commenter (Ex. 23) was concerned that local approval of the CBDPPs by DOE field offices could lead to uneven enforcement and increased cost of compliance. DOE does not agree with this assessment, and believes that the Head of DOE Field Element is not only responsible for operations within his or her jurisdiction, but is also familiar with the operations and any related special circumstances or unique situations that may affect implementation or effectiveness of the CBDPP. Thus, DOE believes the Head of DOE Field Element is the most appropriate DOE approval authority for CBDPPs. DOE notes, however, that mechanisms exist to provide independent oversight of DOE's field organizations. Specifically, the Office of Oversight within the Office of Environment, Safety and Health is charged with providing information and analysis needed to ensure that DOE's top management officials, Congress and the public have an accurate and comprehensive understanding of the effectiveness, vulnerabilities, and trends of DOE's environment, safety, health, nuclear safeguards, and security policies and programs. DOE believes that this independent oversight will help assure consistency among CBDPPs across the complex.

Section 850.10(b)(1) establishes a 90-day period for DOE to review and either approve or reject the CBDPP. During its review, DOE may direct the contractors to modify the CBDPP. If DOE takes no action within 90 days, the initial CBDPP is considered approved. DOE established this 90-day time frame to facilitate timely implementation of program elements by responsible employers and to ensure that Heads of DOE Field Elements respond to responsible employers' submissions.

One commenter (Ex.18) stated that labor organizations should receive initial and updated CBDPPs. DOE notes that proposed section 850.10(b)(2) would require contractors to give interested DOE offices, affected workers, and designated worker representatives a copy of the CBDPP, upon request. This provision is retained in section 850.10(b)(2) of the final rule. This section ensures that workers and their representatives have access to information that is related to the protection of their health during the performance of DOE activities.

Section 850.10(c) requires responsible employers to update the written CBDPP in two circumstances: (1) whenever a significant change or addition is made to the program, and (2) whenever a contractor or subcontractor changes. DOE believes that such updates are warranted to ensure that the CBDPP accurately reflects workplace conditions and appropriately addresses specific workplace beryllium exposure hazards.

This section also requires that responsible employers review their written CBDPPs at least annually and revise these programs as necessary to reflect any significant changes. Only those sections of the CBDPP that require a change will have to be resubmitted to the Head of DOE Field Element for approval. DOE considers the annual review cycle to be appropriate and necessary to ensure that CBDPPs remain up-to-date and that they accurately reflect workplace conditions and required control procedures.

Section 850.10(d) ensures that CBDPPs are developed and implemented consistent with the requirements imposed by the National Labor Relations Act (NLRA), 29 U.S.C. 141 *et seq.*, on employers in this context, and not to create obligations in excess of those that would be found in such circumstances under the NLRA.

Section 850.11–General CBDPP Requirements

Section 850.11 establishes the general requirements of the CBDPP. Section 850.11(a) specifies that the CBDPP must address all existing and anticipated operational tasks that fall within its scope. In addition, the section requires all responsible employers to develop and implement a CBDPP that is integrated into DOE's existing worker protection program. By including this provision, DOE notes the importance of controlling beryllium hazards within the framework of the worker protection program established under DOE Order 440.1A (or, if applicable, under predecessor orders) and related DOE health and safety initiatives. The existing industrial hygiene and occupational medicine programs provide the basis for protecting DOE Federal and contractor workers from health hazards like beryllium exposure. DOE believes that establishing a beryllium exposure control program outside the framework of this accepted program may create redundant and potentially inconsistent requirements.

One commenter (Ex. 23) stated that the proposed requirement to specify in the CBDPP existing and planned operational tasks within the scope of the rule would not be feasible for decontamination and decommissioning (D&D) closure sites. This commenter argued that, due to the non-routine and unpredictable nature of D&D projects, identifying D&D tasks in the CBDPP would result in unnecessary costs, project delays, and administrative burdens because the CBDPP would have to be constantly updated. DOE strongly disagrees, and believes that identifying operational tasks within the scope of the CBDPP at D&D closure sites is practical and necessary. The non-routine and unpredictable nature of operations on D&D closure sites often makes such operations more hazardous than routine production operations involving beryllium. DOE believes that the appropriate way to protect workers from this increased hazard potential is through the implementation of the structured assessment, planning, and control provisions of the CBDPP. Based on experience under the interim CBDPP policy, DOE believes the CBDPP is feasible for D&D operations. DOE also notes that OSHA's Hazardous Waste Operations and Emergency Response standard, 29 CFR 1910.120, requires employers at hazardous waste remediation sites, in addition to conducting ongoing task-specific hazard analyses, to develop a site specific safety and health plan that addresses existing and planned activities. Thus, DOE has retained this requirement in the final rule.

Section 850.11(b) requires responsible employers to tailor the scope and content of their CBDPPs to the specific hazards associated with the DOE beryllium activities being performed. In addition, section 850.11(b)(1) requires that these programs include formal plans outlining how responsible employers will ensure that occupational exposures to beryllium are maintained at or below the PEL (8-hour TWA PEL of 2 $\mu g/m^3$).

Section 850.11(b)(2) further specifies that the responsible employer's CBDPP must, at a minimum, address each requirement in Subpart C of the rule. Section 850.11(b)(3) clarifies that the CBDPP provisions must focus on: (i) Minimizing the number of current workers exposed and potentially exposed to beryllium; (ii) minimizing the number of opportunities for workers to be exposed to beryllium; (iii) minimizing the disability and lost time experienced by workers due to CBD, beryllium sensitization, and associated medical care; and (iv) setting challenging exposure reduction and minimization goals to facilitate the minimization of worker exposures. DOE believes that the establishment of exposure reduction and minimization goals is essential to the success of the CBDPP and in moving toward the

ultimate goal of preventing CBD within the DOE complex.

DOE is sensitive to concerns that exist within its community regarding the need to approach exposure reduction and minimization objectives in a responsible and realistic manner. Accordingly, section 850.11(b)(3)(iv) establishes a performance-based requirement that will allow responsible employers to establish their own exposure reduction and minimization goals tailored to their unique workplace needs and conditions, subject to DOE review and approval pursuant to section 850.10(b). DOE intends for responsible employers to establish reasonable, but challenging, goals based on sound industrial hygiene principles and the specific circumstances for each affected DOE workplace and location. DOE expects responsible employers to consider, in establishing these goals, the current level of worker exposures, the number of workers exposed, the existing controls that are in place, the technical feasibility and exposure reduction potential of possible additional controls, and the cost and operational impact of the controls.

Section 850.12–Implementation

Proposed in section 850.12 required responsible employers to manage and control beryllium exposures in all DOE beryllium activities consistent with the approved CBDPP, the rule, or any other program, plan, schedule or other process established by this part, as well as requirements in other applicable Federal statues and regulations. One commenter (Ex. 16) believed that the preceding requirement should be changed to state that DOE and contractor personnel follow the CBDPP only. This commenter's concern was that including all applicable programs, plans, etc., was too broad. DOE agrees and has deleted including all applicable programs, plans, etc., from the final rule.

Section 850.12(c) clarifies DOE's position that tasks involving potential beryllium exposure that are not covered under the CBDPP may not be initiated until the CBDPP has been updated to include them and the updated plan has been approved by the appropriate Head of DOE Field Element. The rule provides an exception to this requirement for urgent and unexpected situations. In such cases, the task could proceed with the written approval from the Head of DOE Field Element prior to the CBDPP being revised and approved. One commenter (Ex. 16) sought clarification as to when a change in the CBDPP was required. This commenter proposed that when new beryllium activities require additional controls and/or procedures, a change in the CBDPP is warranted. Also, when new activities are within the range of potential exposures to beryllium as described in the existing CBDPP, the commenter suggested that no revision should be necessary. DOE's position is consistent with the views of this commenter. In general, only those activities outside the scope of the existing CBDPP would require a revision to the CBDPP.

Section 850.12(d) recognizes that, depending on the circumstances of the work, responsible employers may have to take other actions to protect their workers, and DOE does not intend to preclude such actions by the provisions of the rule. DOE recognizes that individuals responsible for implementing CBDPP activities must use their professional judgment in protecting the health and safety of workers. Nothing in the rule should be viewed as relieving these individuals of their professional responsibility to take whatever actions are warranted to protect the health and safety of the workforce.

Section 850.13–Compliance

Section 850.13(a) requires responsible employers to conduct DOE activities involving beryllium in compliance with their respective CBDPP that has been approved by the Head of DOE Field Element. Through this provision, DOE recognizes that even the best CBDPP will not adequately protect workers if it is not followed at the site. Section 850.13(b) requires that once the rule takes effect, responsible employers have 2 years to fully implement all aspects of the program (written plans, schedules, and other measures). Although DOE seeks to lessen the burden on responsible employers by permitting them to phase in costly controls over the 2-year period, DOE expects employers to implement portions of the program as soon as practical during the 2-year period.

Section 850.13(c) provides that the responsible employer in charge of an activity involving a potential for beryllium exposure is responsible for complying with the rule. When no contractor is responsible for the activity and Federal employees perform the activity, this section requires DOE to be responsible for compliance.

Subpart C—Specific Program Requirements

Subpart C of this rule establishes performance-based requirements for the CBDPP. These requirements are designed principally to prevent CBD by reducing the number of workers exposed to beryllium, minimizing the potential level of beryllium in the workplace atmosphere, and continually monitoring worker health to ensure that workplace controls are sufficiently protective. DOE expects implementation of the rule to increase its understanding of the development and course of CBD, which may lead DOE, at some future date, to propose modifications of this rule.

Section 850.20—Baseline Beryllium Inventory

Section 850.20(a) requires responsible employers to develop a baseline beryllium inventory. By developing the baseline inventory, responsible employers will accomplish the following functions that are critical to the success of the CBDPP: (1) Identification of locations and operations that should be physically isolated from other areas to prevent the spread of contamination, (2) identification of areas in which worker access should be restricted to minimize the number of workers who could be exposed, (3) identification of beryllium contamination that must be controlled in facilities that are scheduled for decontamination and decommissioning, (4) identification of beryllium contamination in facilities that are being used for non-beryllium activities, to determine the need for cleanup, and (5) the determination of which workers should be covered under the CBDPP.

Section 850.20(b) supplements the generic inventory requirement under DOE Order 440.1A by requiring responsible employers to review current and historical records, interview workers, and sample as necessary to document the characteristics and locations of beryllium at DOE sites. These supplemental requirements are necessary because those persons who are responsible for activities at DOE sites may not recognize that activities under their supervision involve beryllium or are conducted in areas where beryllium was used in the past. Workers often know of past beryllium activities for which no records exist. Sampling can identify beryllium contamination where the record reviews and worker interviews are not conclusive. These supplemental requirements are particularly necessary because past beryllium operations at DOE facilities were often conducted in uncontrolled work areas.

Section 850.20(b)(3) requires that responsible employers conduct air, surface, and bulk sampling procedures to characterize the beryllium. Characterizing the beryllium is

necessary to assess and control beryllium workplace hazards. Responsible employers should conduct the sampling that is appropriate for the specific workplace conditions and the suspected types and locations of beryllium contamination. Sampling techniques could include collecting area and wipe samples and collecting personal breathing zone samples. (Sections 850.24(a), (b), and (e)–(g) address the personal monitoring that may be a component of the baseline inventory.)

Section 850.20(c) requires responsible employers to ensure that individuals conducting the baseline beryllium inventory activities have sufficient qualifications in industrial hygiene. DOE believes that this provision is necessary to ensure that the inventory is accurate and complete. DOE requested in the NOPR that interested parties submit comments on the need to provide further specification in the rule regarding the minimum qualifications that an individual must possess to perform certain components of the CBDPP, such as hazard assessments and exposure monitoring. One alternative approach suggested was use of OSHA's "competent person" definition to define competency of the individual. Another alternative was to require that hazard assessments and exposure monitoring be performed by a "certified industrial hygienist" (CIH) as defined by the American Board of Industrial Hygiene (ABIH).

DOE received 14 comments in response to this request. Two of the 14 commenters (Exs. 4, 16) agreed with DOE's approach in proposed sections 850.20(c), 850.21(b) and 850.24(a). A commenter (Ex. 16) noted that if more prescriptive definitions are used to define personnel qualifications, the definitions should be appropriate to the required task. For instance, CIHs should conduct hazard assessments, while individuals possessing a lower level of knowledge should conduct exposure monitoring. Another commenter (Ex. 4) favored the use of OSHA's "competent person" definition over requirements for a CIH if DOE elected to use one of these more prescriptive definitions.

Two commenters (Ex. 20, 29) stated that the industrial hygiene competency requirements in proposed sections 850.20(c), 850.21(b) and 850.24(a) were too subjective and recommended instead, the use of OSHA's "competent person" definition. A commenter (Ex. 20) further noted that OSHA's Asbestos Standard, 29 CFR 1926.1101(b), included definitions for "competent person," "industrial hygienist," and "certified industrial hygienist" and outlined specific training courses that a competent person must complete. Two other commenters (Exs. 3, 31) favored the use of OSHA's "competent person" definition in lieu of the industrial hygiene competencies, but took exception to the last phrase of the definition: "and who has the authorization to take prompt corrective measures to eliminate [hazards]." The commenters were concerned that limiting the performance of assessments and monitoring to individuals with the authority to take prompt corrective actions would exclude other qualified individuals, such as third-party industrial hygienists.

Nine of the 14 commenters recommended that a CIH participate at some level in the performance of beryllium inventories, hazard assessments, and exposure monitoring. One commenter (Ex. 30) stated that monitoring and assessments must be performed by a CIH, while the other commenters (Exs. 3, 11, 13, 16, 19, 26, 28, 31) suggested that qualified and trained persons working under the direct supervision of a CIH could conduct these tasks, and that limiting the actual performance of monitoring and assessments to CIHs would be too restrictive and unnecessary. Although these commenters did not believe that a CIH is needed to actually perform monitoring and assessments, many did believe that minimum qualifications for those individuals performing these tasks must be specified in the final rule. For instance, one commenter (Ex. 11) recommended that DOE require that these individuals possess sufficient industrial hygiene experience in addition to knowledge. Another commenter (Ex. 13) suggested that a CIH, Industrial Hygienist in Training (IHIT) as defined by the ABIH, or person with "demonstrably equivalent qualifications" perform assessments and monitoring. Another commenter (Ex. 23) suggested that the industrial hygienist definitions in DOE's "Functional Area Qualification Standard," or as defined by AIHA, be used to prescribe the qualifications required to perform monitoring and assessments.

DOE agrees with the overwhelming majority of commenters who favored a more prescriptive definition. DOE believes that a more prescriptive definition will ensure proficiency and consistency in the conduct of assessments and monitoring as well as in the overall implementation of the CBDPP. Accordingly, DOE has provided language in sections 850.20(c), 850.21(b) and 850.24(a)(1) of the final rule for the use of qualified individuals such as a CIH to manage and supervise beryllium inventories, hazard assessments, and exposure monitoring, and the use of individuals with sufficient industrial hygiene knowledge and experience to actually perform these tasks. DOE believes this will provide the level of consistency required to ensure that hazards are properly identified and workers are appropriately protected without being overly prescriptive. In this regard, DOE agrees with the commenters who stated that the level of expertise needed to perform beryllium inventories, hazard assessment, and exposure monitoring does not require a CIH, and that such a requirement would cause an unnecessary resource strain on both DOE and its contractors.

Five persons commented on other provisions of the proposed baseline inventory section. Three of the commenters (Exs. 9, 21, 28) suggested that DOE provide in the final rule greater specificity than DOE proposed for baseline inventory requirements. DOE agrees with these commenters and in the final rule has modified the requirement for reviewing records to cover both current and historical records. The final rule also modifies the requirement for conducting sampling to specify air, surface, and bulk sampling. DOE believes that these changes clarify DOE's intent, express good industrial hygiene practice, and continue to allow the responsible employer appropriate flexibility in conducting the baseline inventory. One commenter (Ex. 9) suggested that DOE also specify in the final rule that baseline inventories include the locations where beryllium activities are planned. DOE considers locations where beryllium activities are planned to be locations of potential beryllium contamination and exposure that must be included in the baseline inventory under paragraph (a), and, therefore, no change is needed.

One commenter (Ex. 18) recommended that the final rule mandate the disclosure of health and safety documents related to past beryllium emissions and exposures. DOE has not included such a provision in the final rule because the Freedom of Information Act (5 U.S.C. 552) already provides for the release of federal government records, except for specified types of records that contain sensitive information, such as classified information relating to national defense or foreign policy, information in personnel and medical files, and trade secrets or other confidential business information. Requests to DOE for release of information related to past beryllium use and exposures may be submitted to the appropriate DOE field office. Such requests should follow DOE's

procedures for Freedom of Information Act requests in 10 CFR Part 1004. Also see the discussion of public access to beryllium records in the preamble discussion of section 850.39 (Recordkeeping and use of information).

The same commenter (Ex. 18) recommended that the final rule provide for independent review of the responsible employer's implementation of the CBDPP. DOE does not think that such a provision is necessary, because existing mechanisms already provide independent oversight of DOE's contractors and include independent oversight of DOE's field organizations. The DOE Office of Environment, Safety and Health's Office of Oversight is charged with providing information and analysis needed to ensure that DOE's top management officials, Congress, and the public have an accurate and comprehensive understanding of the effectiveness, vulnerabilities, and trends of DOE's environment, safety, health, nuclear safeguards, and security policies and programs. In addition, any interested individual or organization may conduct a review of a responsible employer's compliance with this rule based on information obtained from DOE.

One commenter (Ex. 14) recommended that the final rule provide funding for the baseline inventory, and contended that responsible employers will not conduct the baseline inventories unless the funding required for this task is explicitly established by the final rule. DOE does not require its contractors to perform unfunded tasks, but funding of DOE programs is appropriately handled through the federal government's budget process and not through the regulatory process. DOE expects that its program offices will request the funds needed to meet the obligations and objectives of their programs and activities, including compliance with the CBDPP.

Section 850.21—Hazard Assessment

Because the identification of the possible presence of beryllium in a workplace does not, in and of itself, suffice to determine whether a hazard exists or whether various control measures must be employed, section 850.21 of the final rule requires responsible employers to conduct a beryllium hazard assessment to characterize workplace beryllium exposure hazards. This requirement allows each site the flexibility to determine the appropriate risk-based approach for assessing beryllium-related hazards in its worksites where the baseline inventory has established that beryllium is present. As noted by one commenter (Ex. 25), flexibility in conducting hazard assessments is particularly important because operations, conditions, and the potential for exposure may vary greatly from operation to operation and facility to facility.

Section 850.21(a) requires the responsible employer to conduct an analysis of existing worksite conditions, exposure data, medical surveillance trends, and the exposure potential of planned activities. In addition, section 850.21(a) specifies that the responsible employer must prioritize potential exposure activities so that the activities with the greatest risks of exposure are evaluated first. DOE believes that prioritizing activities is a logical first step in initiating a hazard assessment. Targeting high-risk beryllium operations is an effective way to reduce potential beryllium exposures throughout DOE facilities.

Section 850.21(b) requires responsible employers to ensure that hazard assessments are managed by qualified individuals (e.g., a CIH), and that the individuals assigned to conduct hazard assessments have sufficient knowledge and experience to perform such activities properly. DOE requested in the NOPR that interested persons submit comments on the need to further specify in the rule the minimum qualifications that an individual must possess to perform certain key components of the CBDPP, such as hazard assessments. DOE received 14 comments in response to this request. As noted in the preamble discussion of section 850.20(c), 10 of the commenters either suggested or supported establishing an additional specification that hazard assessments be performed under the supervision of a CIH. DOE generally agrees with these commenters about the need for a qualified individual to manage hazard assessments and certain other tasks required by the rule. But DOE will not require that person to be in all cases a CIH. Thus, DOE provides in section 850.21(b)(1) that a qualified individual, such as a CIH, must manage hazard assessments performed for the CBDPP. By use of this language, DOE leaves open the possibility that a responsible employer, in a particular case, may determine that someone who is not a CIH possesses the requisite qualifications to manage the hazard assessments.

In addition to the comments on the CIH issue, DOE received only minor comments on section 850.21. One commenter (Ex. 21) suggested that the exposure potential of planned activities should be rank ordered to better focus each site's resources and efforts. DOE agrees with this commenter, and in the final rule has modified the requirement for hazard assessments to require the prioritization of beryllium activities, beginning with those activities that present the greatest risks of exposure. Another commenter (Ex. 30) was concerned about the use of existing data, such as exposure monitoring results, in the hazard assessment. While this commenter believed that using existing data is appropriate, the commenter warned against the potential for errors when relating existing data to current operations. In particular, this commenter suggested that existing data relating to exposure monitoring is often not well documented or is of poor quality, thus making it difficult to determine whether the sampling is representative of current beryllium operations. DOE agrees that existing data can be a valuable tool if collected and documented properly, and in many cases use of such data will expedite the hazard assessment process. At the same time, DOE also shares this commenter's concerns regarding the accuracy and applicability of existing data and has retained in section 850.21(b) the requirement for the hazard assessment to be managed by a qualified individual, such as a CIH. DOE's intent is that this requirement will help ensure that the data considered in the hazard assessment accurately reflects current site conditions and hazards.

Another commenter (Ex. 24) favored the triggering of a hazard assessment at detectable airborne beryllium levels from personal air samples. DOE agrees that if such data is available, it must be considered in the hazard assessment. As another commenter (Ex. 28) pointed out, however, a hazard assessment should not be limited to the inhalation risks posed by beryllium but must also include the presence and characteristics of beryllium contamination in a facility. Accordingly, the final rule requires the responsible employer to perform a hazard assessment whenever the baseline inventory establishes the presence of beryllium in an area.

Still another commenter (Ex. 11) requested that DOE include a non-mandatory appendix to the rule to provide guidance on how to perform a hazard assessment. This commenter was concerned that inexperienced industrial hygienists may be called upon to perform a hazard assessment, and suggested that additional guidance would be needed to assure accuracy and consistency. DOE believes this concern is addressed in section 850.21(b), which requires that hazard assessments be managed by qualified individuals, such as CIHs, and performed by individuals

with sufficient knowledge and experience to perform such tasks. Accordingly, DOE has not included the requested appendix to provide guidance on how to perform a hazard assessment as a part of this rulemaking.

Section 850.22—Permissible Exposure Limit

In the NOPR preamble, DOE reviewed the scientific evidence suggesting that the current OSHA 8-hour TWA PEL does not sufficiently protect worker health. However, DOE also stated that, in its view, it is difficult to determine from this scientific evidence the exposure level necessary to eliminate the risk of contracting CBD. For this reason, DOE retained the existing OSHA 8-hr TWA PEL in proposed section 850.22, and proposed other provisions to minimize worker exposure to airborne beryllium in DOE facilities. In addition, DOE included in proposed section 850.22 language providing that DOE would adopt a more stringent 8-hour TWA PEL if OSHA promulgated one through the rulemaking process. Finally, DOE requested in the NOPR that interested persons submit any compelling scientific evidence that would assist DOE in establishing a new, more protective exposure limit for DOE facilities.

Fifteen persons commented on the 8-hour TWA permissible exposure limit requirements in the proposed rule. Of these 15 commenters, four supported DOE's proposal to retain the OSHA 8-hour TWA PEL (Exs. 4, 19, 26, 29). One of these four (Ex. 29) took issue with DOE's conclusion that the existing OSHA PEL was not protective. This commenter pointed to the inaccuracies associated with the use of area monitoring data in referenced studies and the fact that most of the referenced studies acknowledged that infrequent exposures above the PEL had occurred within the study group. As a result, this commenter felt that the OSHA PEL should be retained as the exposure limit in DOE work places.

Two commenters cited DOE's policy established in DOE Order 440.1 to adopt the more protective of either OSHA's PEL or ACGIH's threshold limit value (TLV) and recommended that DOE adopt the ACGIH's proposed 8-hour TWA TLV of 0.2 $\mu g/m^3$ as the new DOE exposure limit (Exs. 28, 30). One commenter (Ex. 28) also supported adopting the proposed ACGIH TLV as an 8-hour TWA action level, which DOE has done in the final rule. (See section 850.23 in this Section-by-Section Discussion for further discussion of the action level.) Another commenter opposed adopting the proposed ACGIH limit and took issue with the policy in DOE Order 440.1A, stating that any new DOE limit should be subject to the rulemaking process (Ex. 16).

Five other persons suggested that DOE adopt one of a variety of lower exposure limits ranging from the limit of detection to the NIOSH Recommended Exposure Limit (REL), which is a ceiling limit of 0.5 $\mu g/m^3$. These commenters cited the occurrence of CBD among workers exposed to beryllium at levels below the 8-hour TWA PEL, and some of these commenters argued that studies presented in the Health Effects discussion of the NOPR provided a sufficient basis for the establishment of a new exposure limit. For example, one commenter (Ex. 35) cited two studies that evaluated the occurrence of CBD among the general population around a beryllium plant in Lorain, Ohio (refs. 5 and 6). Relying on these studies, this commenter suggested that the U.S. Environmental Protection Agency's ambient air criterion for beryllium of 0.01 $\mu g/m^3$ could be used as a basis for a new 8-hour TWA exposure limit. Two other commenters (Exs. 14, 24) cited the two Lorain, Ohio community studies, the occurrence of CBD among workers with beryllium exposures "well below the PEL," a study published in 1997 (ref. 31) which suggests that beryllium sensitization occurs at airborne beryllium exposure levels as low as 0.01 $\mu g/m^3$, and the DOE policy to provide a workplace free of recognized hazards (DOE Order 440.1A) to support their position that workers should not be exposed to any detectable level of beryllium. The remaining two commenters that offered suggestions for an alternative exposure limit agreed with DOE's conclusion that the OSHA 8-hour TWA PEL was not sufficiently protective and recommended adopting limits established by other occupational health groups. One commenter (Ex. 18) suggested that DOE adopt NIOSH's REL as a DOE exposure limit while the other (Ex. 22) suggested that DOE apply a safety factor of 4 to the ACGIH 8-hour TLV and use 0.05 $\mu g/m^3$ as the new DOE limit.

Two other commenters (Ex. 20, 32) agreed with DOE's conclusion that the OSHA 8-hour TWA PEL is not sufficiently protective and recommended that DOE establish a new exposure limit. These commenters, however, did not offer suggestions for alternative new exposure limits. Another commenter did not directly address DOE's proposal to retain the OSHA PEL, but instead recommended that DOE should consider the possible effects of particle size on the occurrence of CBD.

DOE has carefully considered each of these comments and available scientific data, and continues to believe that its original conclusion, as outlined in the proposed rule, remains valid. Specifically, DOE believes that existing scientific data indicates that there are reasonable grounds to conclude that the OSHA 8-hour TWA PEL for beryllium may not be sufficiently protective of worker health, a conclusion supported by 12 of the 15 commenters that addressed this section of the proposed rule. DOE is particularly influenced by the published studies (refs. 16–17, 21) indicating that workers exposed below the current PEL are contracting beryllium disease and exhibiting Be-LPT sensitivity. A recent article by Eisenbud (ref. 29) also concludes that it "appears" the current PEL is not protective enough.

However, DOE also believes, based on available scientific data, that it is difficult to determine the exposure level necessary to eliminate the risk of contracting CBD and, therefore, that the best approach to providing improved worker protection is through the establishment of a conservative 8-hour TWA action level, coupled with aggressive exposure reduction and minimization efforts, and the collection of medical surveillance data to better understand the cause of CBD. Accordingly, DOE has retained the OSHA 8-hour TWA PEL in section 850.22 of the final rule and has retained the action level concept of the proposed rule, although at a lower level (see section 850.23 discussion). Section 850.22 has been revised to simply reference 29 CFR 1910.1000, instead of specifying the current numerical limit. DOE intends this provision to result in the automatic incorporation of a more stringent PEL that OSHA may subsequently promulgate. This does not represent a substantive change to the provision as proposed.

In this rule, however, DOE has decided not to follow the policy under the more general worker protection program established by DOE Order 440.1A of adopting the more protective of either the OSHA PEL or the ACGIH TLV. The incorporation of any new ACGIH TLV in this rule would require that DOE conduct a rulemaking on the specific exposure level and present the scientific basis for public comment. As stated previously in this **SUPPLEMENTARY INFORMATION** section, DOE believes, based on the existing scientific evidence, that such a rulemaking is premature. By contrast, DOE may incorporate an OSHA PEL in this rule because the OSHA PEL is promulgated following notice and comment

rulemaking, and the rules of the Office of the Federal Register permit a reference to another part of the Code of Federal Regulations.

DOE proposed, in section 850.22(a) of the NOPR, to adopt the STEL established by the ACGIH of 10 μg/m³, averaged over a 15-minute sampling period. In the final rule the STEL has been deleted, because the proposed STEL would not provide any added protection for the worker given that the new action level of 0.2 μg/m³ would be exceeded in less than 15 minutes where exposure levels are at 10μg/m³. DOE did not seek to establish a lower STEL because, as in the case of a lower PEL, available scientific data do not provide a sufficient basis for the establishment of a new STEL.

Section 850.23—Action Level

DOE proposed in the NOPR to establish an 8-hour TWA action level of 0.5 μg/m³. In selecting the proposed action level, DOE considered a number of factors. DOE considered OSHA's substance-specific health standards, which typically establish action levels for hazardous and toxic substances at one-half the 8-hour TWA PEL. Applying this approach to beryllium would have resulted in a proposed 8-hour TWA action level of 1.0 μg/m³. OSHA's action levels are premised on the safety of its PELs, and are set to provide an additional margin of safety. As explained in the preceding discussion, however, there is a body of evidence suggesting that the OSHA PEL for beryllium does not adequately protect worker health. Therefore, DOE decided that a lower action level is appropriate for DOE facilities. According to the results of the 1996 DOE survey of DOE facilities which reported potential beryllium exposures, two DOE facilities (Pantex and Rocky Flats) had already employed an action level of 0.5 μg/m³. Another facility (Lawrence Livermore National Laboratory) reported the use of an "administrative warning range" of 0.2 to 2.0 μg/m³, which triggered a requirement for an investigation, and six DOE facilities employed an action level of 1.0 μg/m³. In light of this experience, DOE proposed adopting an action level at the lower end of existing DOE complex action levels (0.5 μg/m³), rather than follow the typical OSHA practice, in order to implement aggressive yet achievable exposure minimization.

The majority of comments received on the proposed rule agreed with the DOE's approach of using an action level that is lower than the typical OSHA action level, but called for an even lower level than DOE had proposed. The most commonly recommended level was 0.2 μg/m³, which is the same level as the ACGIH proposed TLV. Most commenters believed that this level would prevent additional cases of beryllium sensitization and disease. DOE believes that there is reasonable technical basis for selecting 0.2 μg/m³ as an action level, based on the following scientific analyses.

The U.S. Environmental Protection Agency's (EPA) Integrated Risk Information System includes a Reference Concentration of 0.02 μg/m³ for beryllium, which is "an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of noncancer effects during a lifetime" (ref. 33). This concentration is based on epidemiology studies. This continuous 24-hour per day, level translates into an 8-hour TWA level of 0.84 μg/m³.

Merrill Eisenbud conducted a study of CBD based on air sampling, atmospheric dispersion modeling, and analysis of a beryllium production plant's past operations. Eisenbud concluded that the lowest beryllium concentration at the 3/4-mile boundary, beyond which no community cases of chronic beryllium disease were found, was 0.025 μg/m³ during the 7-year period the plant operated at full capacity (ref. 29). This 24-hour per day level translates into an 8-hour TWA level of 0.84 μg/m³, which essentially is the same level that the EPA found to be without appreciable risk of causing noncancer effects (i.e., CBD).

The ACGIH, a professional organization that publishes occupational health consensus standards, has proposed to change its 8-hour TWA TLV from 2 μg/m³ to 0.2 μg/m³, based on its review of recent beryllium epidemiology studies (ref. 32).

The DOE recognizes that the EPA (0.84 μg/m³), Eisenbud (0.84 μg/m³), and ACGIH (0.2 μg/m³) levels are normally used as exposure limits rather than action levels. However, based on limitations of the studies done to date, the difficulties in determining a safe threshold level for occupational exposure to beryllium, and DOE's decision to implement aggressive exposure reduction and minimization efforts, DOE has decided that the most prudent course is to lower the action level to 0.2 μg/m³ rather than set a new exposure limit. The available science suggests that this level would be protective; is one-quarter of the EPA and Eisenbud levels and the same as the ACGIH proposed level. This is the lowest action or trigger level reported by any DOE facility under the interim CBDPP, and a lower level has not been demonstrated as being practicable. Lowering the action level to 0.2 μg/m³ will result in greater protection for the affected DOE work force by triggering additional monitoring, surveillance, respiratory protection, and other protective measures.

Benefits of lowering the action level. As specified in this rule, the action level triggers the use of a number of controls and protective measures designed to protect employees from exposures to beryllium, including:

- Periodic exposure monitoring (10 CFR 850.24 (c));
- Exposure reduction and minimization measure (10 CFR 850.25);[4]
- Regulated areas (10 CFR 850.26);
- Hygiene facilities and practices (10 CFR 850.27);
- Respiratory protection (10 CFR 850.28); and
- Protective clothing and equipment (10 CFR 850.29).

Thus, DOE sites where exposure levels exceed the action level would be required to implement these controls to provide further protection to workers exposed above the action level. This additional protection will reduce the exposure levels experienced by these workers, consequently reducing their risk of developing beryllium-related disease and other health effects. Setting the action level at 0.2 μg/m³, as opposed to 0.5 μg/m³, does not alter the set of controls that are triggered,[5] but does alter the timing of these additional controls. The additional protective measures triggered by the action level will be put into effect earlier. For example, consider an activity where airborne concentrations of beryllium start very low (below 0.2 μg/m³), but rise over time (e.g., over a course of days or weeks) in the workplace. Assume also that airborne concentrations will eventually exceed 0.5 μg/m³. If the responsible employer recognizes the potential for exposures to exceed the action level in this activity, this rule (as well as prudent industrial hygiene practice) would require the responsible employer to conduct exposure

[4] The rule does not require that exposure reduction and minimization efforts (e.g., engineering controls and work practices) be triggered by the action level. DOE expects, however, that affected sites will specify that some engineering controls and work practices be triggered by the action level in their CBDPP plans.

[5] DOE did alter the set of controls that are triggered by the action level between the proposed and the final rule. This, however, was not done as a result of setting a lower action level, but was in response to comments on the proposed rule.

monitoring to determine if and when the action level is exceeded. In this situation, once the 0.2 μg/m³ threshold is crossed, the responsible employer would be required to implement the controls specified above, and workers would benefit from the additional protection provided by those controls. Under an action level of 0.5 μg/m³, protective measures would not be implemented until the airborne concentrations exceeded 0.5 μg/m³. Thus, during the time that exposures are between 0.2 μg/m³ and 0.5 μg/m³, workers would not be afforded the additional protection of the triggered controls. Thus, the first incremental benefit of setting the action level lower is the reduction in risk afforded by the controls triggered during the time that exposures are between 0.2 μg/m³ and 0.5 μg/m³ (See Table 9).

The second benefit from setting the action level lower is to expand the number of workers afforded the additional controls (See Table 10). DOE believes there are a number of workers exposed to airborne concentrations of beryllium between 0.2 μg/m³ and 0.5 μg/m³, but who are never exposed above 0.5 μg/m³. DOE estimates that between 342 and 460 workers may be exposed at these levels.[6] Under an action level of 0.5 μg/m³, these workers would not be afforded the protection of controls triggered by the action level. Under an action level of 0.2 μg/m³, however, these workers are afforded the additional controls. These additional controls will reduce the exposures faced by these workers, leading to a reduction in their risk of developing beryllium-related disease and other health effects. Thus, the second benefit of using the lower action level is a reduction in risk among workers exposed to airborne concentrations between 0.2 μg/m³ and 0.5 μg/m³.

Quantitative estimates of the reduction in risk and the consequent reduction in the incidence of beryllium-related disease and other health effects are not possible due to a lack of necessary information. As discussed in this preamble and the Economic Analysis (Chapter 1, Section 1.1), no quantitative dose-response relationship has been defined for beryllium. Without this information, DOE is unable to provide a quantitative estimate of the benefit of using a lower action level. Nevertheless, DOE believes that the use of 0.2 μg/m³ action level as opposed to the 0.5 μg/m³ is justified based on the benefits discussed above and the number of comments that suggested that an action level lower than 0.5 μg/m³ is necessary.

Other issues. This revision to the final rule does not accommodate the comments (Exs. 12, 18, 32) that urged DOE to lower its action level to any detectable level of beryllium. DOE believes it would not be practicable to use any detectable level of beryllium as its action level because beryllium is ubiquitous; it can be detected virtually anywhere if a sufficiently large air sample is taken. Furthermore, according to the EPA's Integrated Risk Information System, discussed above, the United States population is being exposed to detectable background levels of beryllium without an appreciable risk of contracting CBD in their lifetime. Therefore, that level is not supported by the available science.

TABLE 9.—COMPARATIVE COST ANALYSIS FOR DIFFERENT ACTION LEVELS

Category/requirement	Annualized cost for 0.2 μg/m³ action level (final rule)	0.5 μg/m³ action level		0.1 μg/m³ Action level	
		Annualized cost	Difference from 0.2 μg/m³ action level	Annualized cost	Difference from 0.2 μg/m³ action level
Requirements Triggered By The Action Level in the Final Rule:					
Periodic exposure monitoring	$1,962,620	$1,104,421	($858,199)	$3,574,937	$1,612,317
Notify workers monitoring results	66,932	40,411	(26,521)	82,104	15,171
Exposure reduction and minimization	2,707,636	[2] 2,707,636	0	3,579,513	871,877
Regulated areas	0	0	0	8,496	8,496
Change rooms and showers	249,730	249,730	0	272,337	22,607
Respiratory protection	9,085	9,085	0	342,495	333,410
Protective clothing	0	0	0	382,528	382,528
Disposal of protective clothing	0	0	0	42,738	42,738
Subtotal	4,996,004	4,111,284	(884,720)	8,285,149	3,289,144
Other Requirements	26,555,397	26,555,397	0	26,555,397	0
Total for all requirements [1]	31,551,401	30,666,680	(884,720)	34,840,545	3,289,144

Note: Column totals may contain some rounding error.

[1] For this row, the annualized cost represents the annualized cost of the proposed rule for the specified action level.

[2] The costs for exposure reduction and minimization may be lower with a 0.5 μg/m³ action level since fewer requirements would be triggered under the higher action level. The information provided to DOE by the sites, however, did not contain enough information to make an estimate of the reduction in the costs for this category.

[6] The lower bound estimate (342) is the difference between the number of workers exposed above the 0.5 μg/m³ action level estimated in the Economic Analysis (EA) for the proposed rule (894 workers) and the number of workers exposed above the 0.2 μg/m³ action level estimated in the EA for the final rule (1,236 workers). The estimates contained in the two versions of the EA are not, however, completely comparable. In developing the EA for the final rule, DOE obtained new data from the sites on the number of workers exposed above 0.2 μg/m³. For some sites, the reported number of workers exposed above 0.2 μg/m³ was less than DOE's previous estimate of the number exposed above 0.5 μg/m³. To correct for this inconsistency, DOE used the minimum of the two estimates for each site as an estimate of the number exposed above 0.5 μg/m³. This resulted in an estimated 776 workers exposed above 0.5 μg/m³. The difference between this new estimate and the estimated number exposed above 0.2 μg/m³ (1,236 workers) provides the upper bound estimate (460 workers).

TABLE 10.—ESTIMATED NUMBER OF WORKERS BY EXPOSURE LEVEL

Beryllium exposure levels (μg/m³)	Estimated number of workers [1]	Percent of all affected workers
0.0 to 0.1	0	0
0.1 to 0.2	398	24.4
0.2 to 0.5	342 to 460	20.9 to 28.2
Above 0.5	776 to 894	47.5 to 54.7
Total	1,634	100
Total Above 0.1	1,634	100
Total Above 0.2	1,236	75.6

[1] The Economic Analysis (EA) for the final rule estimates that 1,236 workers are exposed above the action limit of 0.2 μg/m³ and that a total of 1,634 workers are currently exposed to beryllium. Thus, 398 workers must be exposed below 0.2 μg/m³ (398 = 1,634 − 1,236). Given that measurements of exposure levels below 0.1 μg/m³ begin to near the detection limits, DOE assumes that all workers exposed below 0.2 μg/m³ would be in the 0.1 to 0.2 group. Next, DOE estimated the upper bound of the above 0.5 group by taking the estimated number of workers exposed above 0.5 μg/m³ from the EA for the proposed rule (i.e., 894 workers). The difference between this number and 1,236 (the number exposed above 0.2 μg/m³) provided the lower bound of the 0.2 to 0.5 group (342 = 1,236+894). To provide the lower bound of the above 0.5 group (776 workers), DOE corrected for an inconsistency between the EA for the proposed rule and the EA for the final rule. In developing the EA for the final rule, DOE obtained new data from the sites on the number of workers exposed above 0.2 μg/m³. For some sites, the reported number of workers exposed above 0.2 μg/m³ was less than DOE's previous estimate of the number exposed above 0.5 μg/m³ (in the EA for the proposed rule). To correct for this inconsistency, DOE used the minimum of the two estimates (i.e., the estimated number of workers exposed above 0.2 μg/m³ in the EA for the final rule and the estimated number of workers exposed above 0.5 μg/m³ in the EA for the proposed rule) for each site as an estimate of the number exposed above 0.5 μg/m³. This resulted in an estimated 776 workers exposed above 0.5 μg/m³ which DOE uses as the lower bound for that group. The difference between this number and the estimated number exposed above 0.2 μg/m³ (1,236 workers) provides the upper bound estimate for the 0.2 to 0.5 group (460 = 1,236 − 776).

NOTE: Column total may contain some rounding error.

Section 850.24—Exposure Monitoring

Section 850.24 establishes CBDPP worker exposure monitoring requirements. The exposure monitoring provisions in this section are necessary to determine the extent of exposure at the worksite; prevent worker overexposure; identify the sources of exposure to beryllium; collect exposure data so that the responsible employer can select the proper control methods to be used; evaluate the effectiveness of selected controls; and provide continual feedback on the effectiveness of the program in controlling exposures. These requirements are more specific than the provisions of exposure monitoring in DOE Order 440.1A.

Exposure monitoring is important not only to determine the level of beryllium to which workers are exposed and the frequency at which workers should be monitored, but also to determine whether other protective provisions of the rule need to be implemented. The employer's obligation to provide respiratory protection under section 850.28, for example, is triggered by monitoring results showing that a worker is exposed at or above the action level. Exposure monitoring results also may help DOE to resolve uncertainties regarding the adequacy of the existing beryllium PEL and to refine the requirements of this rule as needed to protect worker health.

Because of the importance of adequately characterizing and monitoring worker exposures to beryllium, DOE included a specific request in the NOPR asking interested persons for views or information on the need for daily exposure monitoring of all beryllium workers. DOE was considering whether daily exposure monitoring was needed to document and characterize more completely a worker's exposure to beryllium, and to better evaluate the adequacy of existing exposure levels or determine appropriate levels for alternative exposure limits. Of the ten commenters who responded to this request for information, three favored a daily monitoring requirement while seven were opposed.

The commenters who favored daily monitoring for all workers (Exs. 18, 25, 30) argued that daily monitoring of each worker would more accurately document and characterize beryllium exposures. One commenter (Ex. 16) suggested that initial daily monitoring could be replaced with periodic monitoring after sufficient data was obtained. Another (Ex. 30) noted that daily exposure monitoring might be the only accurate way to determine exposures during changing workplace conditions. This commenter suggested that daily monitoring is important in identifying specific work activities that contribute to the worker exposures.

The majority of commenters responding to this request (Exs. 3, 4, 16, 17, 26, 28, 29) objected to daily monitoring of all workers to determine beryllium exposures. These commenters stated that daily monitoring would generate large amounts of data, at great cost, while producing little or no added benefit. Some of these commenters (Exs. 3, 26, 28, 29) favored representative sampling of the workplace, using statistical analysis to determine the number of samples required. These commenters asserted that the principal benefits of a statistically-based monitoring strategy would be the reduction in the number of samples needed and resources used.

After considering all of the comments, DOE agrees that daily monitoring would be unnecessarily burdensome for responsible employers, and that a statistically-based approach will ensure the adequate characterization of worker exposures. This position is reflected in section 850.24(b), as discussed below.

Section 850.24(a) requires that exposure monitoring be managed by a qualified individual such as a CIH, and conducted by individuals with sufficient industrial hygiene knowledge and experience. DOE requested in the NOPR that interested persons submit comments on the need to further specify the minimum qualifications that an individual must possess to perform certain key functions under the CBDPP, including exposure monitoring. Most of the commenters suggested or supported adding a requirement that exposure monitoring be performed under the supervision of a CIH. DOE agrees that a CIH is often best qualified to manage exposure monitoring activities, and provides in section 850.24(a)(1) that exposure monitoring performed for the CBDPP be managed by a qualified individual, such as a CIH. However, in keeping with the performance-based philosophy underlying this rule, DOE

does not preclude a responsible employer from determining, in a particular situation, that a person other than a CIH possesses the requisite knowledge to perform this function. Most of the commenters were of the view that individuals conducting the monitoring, under the management of a qualified individual, need sufficient knowledge and experience but not necessarily the same level of qualification as a CIH.

Section 850.24(b) requires the responsible employer to perform initial exposure monitoring for all persons who work in areas that may have airborne concentrations of beryllium, as determined through the baseline beryllium inventory and hazard assessment. The responsible employer must employ a statistically-based monitoring strategy to obtain the number of samples needed to characterize worker exposures. The initial exposure information is necessary to determine the need for engineering and work practice controls, to select appropriate personal protective clothing and respiratory protective equipment where needed, and to identify the need to establish regulated areas. One commenter (Ex. 28) recommended that sampling should be conducted to determine particle size and chemical characterization of the potential exposure, and another commenter (Ex. 30) recommended use of particle size-selective personal monitoring. DOE has decided to leave details of this nature to the qualified individual who manages exposure monitoring under the CBDPP, rather than attempt to prescribe them in regulations. This type of issue also may be addressed in future DOE guidance on implementing the CBDPP.

Section 850.24(b)(1) requires the responsible employer to determine the beryllium exposure of workers by collecting personal breathing zone samples that reflect worker's exposure to airborne concentrations of beryllium over an eight-hour period. As specified in the definition of "worker exposure" in section 850.3, this is a measurement of the exposure that would occur if the worker were not using respiratory protective equipment. Section 850.3 also includes a definition of "breathing zone," which means "a hemisphere forward of the shoulders, centered on the mouth and nose, with a radius of 6 to 9 inches." Thus, a breathing zone sample is taken as close as practical to the nose and mouth of the worker. For a full description of breathing zone samples, see OSHA's Instruction CPL 2–2.20B, CH–1, Nov. 13, 1990.

DOE recognizes that many of its responsible employers may have performed initial monitoring as part of their efforts to implement DOE Notice 440.1. DOE does not intend to require employers to repeat these efforts if they are adequate under the rule. Accordingly, section 850.24(b)(2) allows employers to use initial monitoring data collected within 12 months before the effective date of this rule to satisfy the rule's initial monitoring requirements. One commenter (Ex. 31) cautioned DOE that any sampling performed prior to the issuance of the final beryllium rule should only be accepted by DOE if the work conditions during the sampling period are the same as current conditions. DOE agrees with this commenter, and notes that several provisions of the final rule require responsible employers to ensure that sampling results reflect current workplace conditions. Specifically, section 850.24(b) requires that the responsible employer obtain a sufficient number of sample results to adequately characterize exposures, and section 850.24(d) requires that the responsible employer perform additional monitoring if operations, maintenance, or procedures change, or if the responsible employer has any reason to suspect a change has occurred which may result in new or additional exposures. Further, DOE believes that the requirement that exposure monitoring be managed by a qualified individual will help assure that exposure monitoring results accurately characterize worker exposures.

Section 850.24(c) requires the responsible employer to conduct periodic exposure monitoring of workers who work in areas where airborne concentrations of beryllium are at or above the action level. Periodic monitoring provides the responsible employer with assurance that workers are not experiencing higher exposures that may require the use of additional controls. In addition, periodic monitoring reminds workers and responsible employers of the continued need to protect against the hazards associated with exposure to beryllium. The collection of exposure monitoring data also enables the SOMD to be informed of the existence and extent of potential sources of beryllium exposure.

Some commenters argued that the periodic monitoring requirements in the rule should be more conservative than proposed in the NOPR. For instance, one commenter (Ex. 13) recommended that the requirement for periodic monitoring be implemented if employee exposures exceed 10% of the PEL while another commenter (Ex. 18) suggested that periodic monitoring be required for all workers regardless of previously measured exposures. DOE has addressed the first commenter's concerns by establishing the action level in the final rule at no greater than 0.2 $\mu g/m^3$ (ten percent of the PEL). DOE does not believe that periodic monitoring should be mandated for all workers regardless of exposure level, as suggested by the other commenter, but rather that the responsible employer should determine the frequency of periodic monitoring where levels are below the action level. However, DOE does encourage sites to establish lower action levels to trigger components of their CBDPP, as part of their exposure reduction and minimization efforts required under section 850.25.

A third commenter (Ex. 14), addressing the periodic monitoring requirements of proposed section 850.24(c), stated that periodic monitoring on a continuous basis is the only way to determine worker exposures. While DOE acknowledges that certain operations may warrant continuous monitoring due to the dynamic nature of day-to-day operations, DOE believes that an inflexible, one-size-fits all monitoring policy is inappropriate due to the wide range of beryllium-related operations within the DOE complex. Accordingly, DOE provides responsible employers the flexibility to determine the monitoring frequency that is needed to sufficiently characterize worker exposures. DOE believes that responsible employers are best positioned to evaluate the potential variability of worker exposures in their operations and to tailor their periodic monitoring approaches as appropriate. Nevertheless, because slight process or procedural changes may go unnoticed over time and because equipment maintenance, aging, or deterioration can affect performance, DOE, in section 850.24(c), is requiring a minimum exposure monitoring frequency of every 3 months (quarterly) for workers who are exposed to airborne concentrations of beryllium at or above the action level.

DOE recognizes that the minimum quarterly monitoring of workers exposed at or above the action level is more frequent than is required in most OSHA expanded health standards. However, DOE considers this minimum monitoring frequency to be necessary due to the uncertainties regarding the adequacy of the current PEL. To supplement this periodic monitoring requirement, section 850.24(d) requires that responsible employers perform additional exposure monitoring when beryllium-related operations or

procedures change, or they have any reason to suspect a change, which may cause new or additional exposures to workers. This additional monitoring is needed to protect workers from elevated exposures resulting from changed circumstances, to quantify how changes affect worker exposure to airborne beryllium, to ensure the continued effectiveness of existing engineering and work-practice controls, and to identify the need for additional control measures to minimize worker exposure to beryllium.

To obtain accurate exposure monitoring results, section 850.24(e) requires that responsible employers use monitoring and analytical methods that have accuracy, at a confidence level of 95 percent, of not less than plus or minus 25 percent for airborne concentrations of beryllium at the action level. The main reason DOE is requiring this degree of accuracy for exposure monitoring results is to ensure that exposure monitoring results are sufficiently accurate at the exposure level that is relevant for the CBDPP. Accuracy of measurements is critical, since certain central requirements of the rule (e.g., engineering controls, exposure reduction and minimization, respirator use, and regulated areas) are triggered by measured worker exposures that meet or exceed the action level. In addition, the medical removal provision requires that a removed worker not be placed in a job where exposure levels are at or above the action level.

Section 850.24(f) further ensures the quality of monitoring results by requiring that all laboratory analyses of air sampling data be performed in a laboratory accredited for metals by the AIHA, or a laboratory that demonstrates quality assurance for metals that is equivalent to AIHA accreditation. Equivalency to AIHA's accreditation means that a laboratory can demonstrate that their testing protocols meet the accreditation standards of AIHA. These accuracy and quality requirements are consistent with similar requirements that appear in many of OSHA's expanded health standards for toxic substances. The only commenter (Ex. 13) to address this issue agreed with DOE that the use of an AIHA accredited laboratory will ensure the quality control, consistency, and accuracy of beryllium sample analyses. DOE has added to the final rule the language "or a laboratory that demonstrates quality assurance for metals analysis that is equivalent to AIHA accreditation," to provide responsible employers more flexibility in selecting a laboratory and to allow the use of an appropriate laboratory currently being used by the employer.

Section 850.24(g)(1) requires responsible employers to notify affected workers of monitoring results, in writing, within 10 working days of receipt of the monitoring results. This section also provides responsible employers with two alternative methods of worker notification: (1) written notification to each affected worker, or (2) posting of monitoring results in a location or locations readily accessible to affected workers. Two commenters (Exs. 16, 23) expressed concern about the use of personal identifiers in posted monitoring results, citing worker privacy concerns.

One commenter (Ex. 26) objected strongly to DOE's proposal to provide notice to workers in a manner that does not identify the worker. This commenter argued that not only is there no right to privacy implicated by posting of sampling results, but that anonymous notification would not further personal accountability for work practices. This commenter cited the Atomic Weapons Establishment's (AWE) experience at its Cardiff (United Kingdom) facility to show the beneficial effects of peer pressure on individual workers' adherence to good work practice. DOE recognizes AWE's experience and the benefits of peer pressure on workers' adherence to good work practices. However, DOE is following the approach used in OSHA's substance-specific standards that have posting requirements, which does not incorporate the principle of applying peer pressure to establish good work practice procedures. DOE, therefore, provides in the final rule that when the posting option is selected, responsible employers must post the results without disclosing the identity of the affected workers. This protection of workers' privacy is consistent with OSHA's substance-specific standards that have posting requirements.

Sections 850.24(g)(2) and (3) deal with cases in which monitoring results indicate that the worker exposure level meets or exceeds the action level. In such cases, the responsible employer is required by paragraph (g)(2) to include in the notice to workers a description of the corrective actions being taken to reduce worker exposure to below the action level. Paragraph (g)(3) requires the responsible employer to notify the SOMD of the results within 10 working days of receipt of the monitoring results. DOE believes that the SOMD must be informed of such exposures in order to refine, as appropriate, the medical surveillance protocol for affected workers to ensure effective monitoring and early detection of beryllium-related health effects.

Section 850.25—Exposure Reduction and Minimization

Section 850.25 establishes the exposure reduction and minimization provisions of the CBDPP that reflect DOE's goal of achieving aggressive reduction and minimization of worker exposures to airborne beryllium.

Section 850.25(a) establishes the baseline requirement that responsible employers ensure that no worker is exposed to airborne beryllium at levels above the exposure limit established in section 850.22.

Section 850.25(b)(1) requires the responsible employer to include in the CBDPP a formal exposure reduction and minimization program to reduce exposure levels that are at or above the action level to below the action level, if practicable. Sections 850.25 (b)(1)(i)-(iv) provide that the formal exposure reduction and minimization program must include: (1) exposure reduction and minimization goals, (2) the rationale to support the goals and a strategy for achieving them, (3) the specific actions that the responsible employer plans to take to achieve the goals, and (4) a means of tracking progress towards meeting the goals or demonstrating that the goals have been met. Where levels are below the action level, section 850.25(b)(2) requires responsible employers to include in their CBDPP a description and rationale for the steps they plan to take to reduce and minimize exposures, if such steps are practicable. Such steps are applicable when exposures are measured below the action level to provide additional worker protection. This requirement assures responsible employer's commitment to address and further reduce exposures, as practicable, below the action level and implementing the steps included in their CBDPP.

Section 850.25(c) provides that responsible employers must apply the hierarchy of industrial hygiene controls, as already required under DOE Order 440.1A, to achieve exposure control. This hierarchy dictates that responsible employers first must implement feasible engineering controls, followed by administrative controls, in their efforts to reduce and minimize exposures. Responsible employers can supplement these controls with personal protective clothing and equipment to reduce exposures where engineering and administrative controls are not feasible.

In summary, section 850.25 establishes a graded approach to reducing and minimizing beryllium exposures to levels as low as

practicable. This approach is familiar to the DOE community because it is similar to DOE's "as low as reasonably achievable" approach to radiation protection. DOE's requirement that the responsible employer establish a formal program of setting and tracking reduction goals for exposures above the action level will result in greater management attention to potential high exposures. The requirement that the responsible employer take steps to reduce and minimize exposures that are below the action level commits DOE to continue reducing and minimizing exposures, but without the same level of management attention since these exposures are believed to represent a lower risk to workers.

Six persons commented on the exposure reduction and minimization requirements of the proposed rule. Two of the commenters (Exs. 18, 23) recommended that the rule require responsible employers to initiate reduction and minimization actions to maintain exposures below the action level, rather than below the exposure limit. DOE would essentially be setting a new DOE exposure limit if it followed this recommendation. As previously explained, DOE believes that setting a new exposure limit would be inappropriate because the scientific data is not fully developed and does not yet provide an adequate basis for determining an appropriate new limit. The discussion of section 850.22, Permissible Exposure Limit, provides greater detail on the issue of lowering the exposure limit.

Three of the commenters (Exs. 4, 18, 33) made recommendations that relate to the appropriate trigger for requiring responsible employers to initiate reduction and minimization actions where exposure levels are below the action level. Two commenters (Exs. 18, 33) recommended that the rule require responsible employers to initiate reduction and minimization actions wherever beryllium is detected. One commenter (Ex. 4) interpreted Table 5 in the NOPR preamble to mean that DOE would expect the responsible employer to undertake actions anywhere exposure levels are greater than zero. DOE believes that using either the limit of detection or greater than zero as the trigger is not practicable because trace levels of beryllium are ubiquitous, and beryllium levels in air can be measured everywhere if a large enough air sample is taken to accumulate sufficient beryllium to exceed the lower detection limit of the analytic method being used. DOE believes that final section 850.25(b)(2) best meets DOE's intention of establishing an effective performance-based rule by requiring responsible employer actions, if practicable, where exposure levels are below the action level.

Another commenter (Ex. 3) questioned the efficacy of enforcing a rule that allows each site to establish individual exposure reduction and minimization goals. DOE believes that this approach is adequately enforceable based on its positive experience using contractual mechanisms to enforce similar requirements in radiation protection regulations.

Section 850.26—Regulated Areas

Section 850.26 establishes the regulated area provisions of the CBDPP. Regulated areas are an effective means of minimizing the number of workers exposed to airborne concentrations of beryllium because they prevent or minimize the spread of beryllium to clean areas. This is consistent with good industrial hygiene practice whenever exposure to a toxic substance can cause serious health effects.

The final rule's requirements for regulated areas are essentially the same as those proposed, with certain good hygiene practices being added in response to a commenter's (Ex. 1) concern discussed below under section 850.26(d).

Section 850.26(a) requires the responsible employer to establish regulated areas where, based on breathing zone samples, the employer determines that workers are exposed to airborne concentrations of beryllium at or above the action level.

Three commenters addressed this provision, as proposed, and suggested either alternate or supplemental criteria to trigger the establishment of regulated areas. One commenter (Ex. 18) suggested that the trigger level be lowered to require that regulated areas be established wherever beryllium is detected. DOE believes that the final rule's significantly lower action level provides a suitable mandatory trigger for the establishment of regulated areas. In addition, DOE believes that the CBDPP exposure reduction and minimization provisions will result in the use of an even lower site-specific action level as improved controls become feasible throughout the DOE complex.

The two other commenters (Ex. 3, 34) suggested that the proposed provision for regulated areas be supplemented with a surface contamination level limit that would trigger the establishment of regulated areas. No reliable correlation has been established between surface contamination level and airborne concentrations of beryllium. DOE, therefore, believes that using a surface contamination level limit as a trigger for the establishment of regulated areas would produce minimal benefits to worker health and has not adopted this recommendation.

One of the commenters (Ex. 3) suggested that if engineering or process controls bring exposure levels to below the action level in a regulated area, the area should remain a regulated area to ensure that controls remain in place. DOE does not agree with this comment. While the rule would not prevent responsible employers from implementing such a practice, requiring that regulated area provisions remain in effect after exposures have been reduced to acceptable levels would impose additional financial burdens on employers with no corresponding improvement in worker protection. In addition, DOE believes that such a mandatory provision could undermine the incentives this rule creates for employers to implement effective engineering or process controls. If employers were required to maintain regulated areas regardless of whether they had implemented effective engineering controls, employers might have less motivation to implement the controls. This commenter's concern is at least partly addressed by section 850.24(d), which requires the performance of additional exposure monitoring if operations or procedures change or if the employer suspects a change that could affect exposure levels.

Section 850.26(b) of the rule requires responsible employers to demarcate areas where worker exposures are at or above the action level in a manner that alerts workers to the boundaries of such areas. Under section 850.38 of this part, warning signs must be posted, stating that only authorized personnel are allowed in the area. Due to the serious nature of the adverse health effects associated with exposure to beryllium, no one should be in a regulated area without proper personal protection.

Section 850.26(c) requires responsible employers to limit access to regulated areas to authorized persons only. DOE intends that only individuals who are essential to the performance of work in the regulated area will be authorized to enter regulated areas. Responsible employers will have to evaluate the affected operation and determine which personnel (including managers, supervisors, and workers) are necessary for the performance of the work and thus are authorized to enter. Methods for preventing unauthorized persons from entering a regulated area may include posting a sign indicating that only authorized persons may enter, the use of locked access doors, and other

security measures as required by worksite conditions. DOE believes that employers are best equipped to determine whether any access control methods are needed in addition to warning signs specified in section 850.38.

Two commenters (Exs. 1, 31) suggested the incorporation of additional personal hygiene controls, specifically recommending that the rule prohibit smoking, eating, and drinking in regulated areas. DOE agrees with these commenters and has included in section 850.27 a prohibition on smoking, eating, and drinking in areas where beryllium is above the action level (i.e., in regulated areas).

Section 850.26(d) requires responsible employers to keep a record of all persons who enter regulated areas. The record must include the name of the person who entered, the date of entry, the time in and time out, and the type of work performed. One commenter (Ex. 26) stated that a log of worker activities is not needed unless DOE is conducting a "prospective risk assessment." This commenter believed that a simple log, only documenting who entered regulated areas, would be sufficient. The intended function of these records is clarified in section 850.39, Recordkeeping and Use of Information. DOE believes that recordkeeping must be adequate to permit DOE to monitor the effectiveness of each responsible employer's compliance activities and to provide information regarding each worker's history of potential exposures. This information will assist the responsible employer's occupational medicine staff in establishing appropriate medical surveillance protocols and will aid in DOE's efforts to establish links between working conditions and potential health outcomes. DOE has retained the proposed regulated area recordkeeping requirements in section 850.26(d) of the final rule.

Section 850.27—Hygiene Facilities and Practices

Section 850.27 of the final rule retains the NOPR requirements for responsible employers to provide change rooms or areas and hand washing and shower facilities for beryllium workers. In addition to these provisions, the final rule also requires responsible employers to provide lunchroom facilities that are readily accessible to beryllium workers, ensure that tables for eating are free of beryllium, that no worker is exposed at any time at or above the action level, and specifies that all of these facilities must comply with the requirements of 29 CFR 1910.141. These hygiene provisions are common in OSHA's expanded health standards designed to protect workers from exposures to hazardous particulates.

Sections 850.27(a)(1) and (2) requires responsible employers to assure that workers observe prohibitions on the availability and use of cosmetics, tobacco and chewing products, and food and beverages in areas where beryllium is above the action level. Section 850.27(a)(3) requires responsible employers to prevent beryllium workers from exiting areas that contain beryllium with contamination on their bodies or their personal clothing. DOE believes that these provisions promote sound work place hygiene practices that may protect workers from exposure to other substances present in the workplace, as well as beryllium. These provisions are commonly included in OSHA's substance-specific health standards.

Section 850.27(b) requires responsible employers to provide clean change rooms or areas for workers who work in regulated areas. In addition, section 850.27(b)(1) requires that separate facilities be provided for workers to change into and store personal clothing and clean protective clothing and equipment. DOE believes that such provisions are necessary to prevent cross-contamination between work and personal clothing and the subsequent spread of beryllium into clean areas of the facility and into workers' private automobiles and homes. These provisions also address the need to prevent contamination of clean protective clothing and equipment, ensuring that protective clothing and equipment actually protect workers rather than contribute to their exposures.

Section 850.27(b)(2) requires that the change-rooms used to remove beryllium-contaminated clothing and protective equipment be maintained under negative pressure, or be located in a manner or area that prevents dispersion of beryllium contamination into clean areas.

DOE received two comments on the hygiene facilities and practices provisions of the NOPR. A commenter (Ex. 25) suggested that the requirement to provide change rooms, hand washing facilities, and showers be based on a hazard assessment. DOE believes that requiring responsible employers to perform a separate hazard assessment to determine the need for change rooms and showers is unnecessary and overly burdensome to responsible employers. The requirement for change rooms and showers is triggered by the requirement to establish regulated areas. Regulated areas, in turn, are required wherever a hazard assessment identifies the potential for worker exposures at or above the action level. Thus, the requirement for change rooms and showers is already indirectly triggered by the results of a hazard assessment.

A commenter (Ex. 23) expressed concern that the impact and burden of constructing new change rooms for D&D closure sites has not been considered in the development of the change room provisions, and argued that alternative methods of compliance should be considered for D&D operations. In fact, DOE has addressed the economic impact of requiring responsible employers to provide change rooms for workers in the economic analysis prepared for the NOPR and made available for public review. Based on that economic analysis, DOE is aware that the cost of change rooms may be substantial for some DOE facilities. However, DOE believes that providing change rooms and showers for workers who work in regulated areas is the most effective method for preventing workers from carrying beryllium contamination on their work clothes and bodies from regulated areas to other areas of DOE facilities and to workers' private automobiles and homes. DOE is unaware of any equally effective alternative method for achieving this objective and, thus, has retained the change room and shower provisions in the final rule. The economic burden may be lessened by steps employers already have taken to comply with existing hygiene facility requirements. For example, 29 CFR 1910.120(n)(7) of OSHA's Hazardous Waste Operations and Emergency Response standard already requires employers to provide showers and change rooms for workers on D&D operations of six months duration or longer. DOE contractors at DOE sites are subject to this requirement through their contracts, which require compliance with DOE Order 440.1A or other analogous Orders or standards.

Consistent with the goal of preventing the spread of contamination into adjacent work areas and into affected workers' homes, section 850.27(c)(1) requires responsible employers to provide shower and hand-washing facilities for workers assigned to regulated areas. In addition to controlling the spread of contamination, showering also reduces the worker's period of exposure to beryllium by removing any beryllium that may have accumulated on the skin and hair. Requiring workers to change out of work clothes, which are segregated from their street clothes, and to shower before leaving the plant, leaving work clothing

at the workplace, significantly reduces the movement of beryllium from the workplace. These steps ensure that the duration of beryllium exposure does not extend beyond the work shift and, thus, protect workers and their families from off-site exposures. DOE recognizes that the installation of such facilities may take time in some cases. Accordingly, section 850.13(b) of the final rule allows responsible employers two years to achieve full compliance with the requirements of the rule.

Section 850.27(d) requires responsible employers to provide beryllium workers working in regulated areas with readily accessible lunchroom facilities in which tables for eating are free of beryllium and no worker is exposed at any time to a concentration of beryllium at or above the action level. DOE believes that it is imperative that workers have a clean place to eat to reduce the likelihood of additional exposure to loose beryllium dust through inhalation or ingestion.

Responsible employers must also assure that workers in regulated areas do not enter the lunchroom wearing protective clothing unless the clothing is properly cleaned beforehand. Responsible employers are given discretion to choose any method for removing surface beryllium from the clothing that does not disperse the dust into the air. These requirements are similar to the hygiene facilities and practices provisions in a number of OSHA's health standards.

Section 850.28–Respiratory Protection

Section 850.28 establishes the respiratory protection requirements for the CBDPP. Section 850.28(a) requires that responsible employers comply with OSHA's Respiratory Protection standard (29 CFR 1910.134). Section 850.28(b) requires that responsible employers provide appropriate respiratory protective equipment for all workers exposed, or potentially exposed based upon task analyses, to airborne concentrations of beryllium at or above the action level. This section also requires the responsible employer to ensure that workers use respirators. Section 850.28(c) requires the responsible employer to include in the respiratory protection program any beryllium-associated worker who requests to use a respirator, regardless of exposure level. Section 850.28(d) requires that responsible employers select and use only National Institute for Occupational Safety and Health (NIOSH)-approved respiratory protective equipment or, if none exist for a DOE beryllium activity, DOE-accepted respiratory protective equipment.

Some of the requirements of section 850.28 are not new. For instance, DOE contractors have historically been required to comply with OSHA standards, including 29 CFR 1910.134, through contract provisions requiring compliance with DOE Order 440.1A and its predecessor orders. DOE also has followed OSHA standards in implementing the Federal Employee Occupational Safety and Health Program. DOE Order 440.1A requires employers to provide, and DOE workers to use, appropriate respiratory protective equipment necessary to protect workers from exposures to hazardous substances. In addition, the provisions of 29 CFR 1910.134 include a requirement that employers select only NIOSH-approved respirators. DOE Order 440.1A expands this requirement to allow for the use of DOE-accepted respiratory protection if NIOSH-approved respiratory protection does not exist for a specific DOE task. The provisions of section 850.28 that are new in this final rule are the requirements for the use of respiratory protection: (1) at the action level (rather than at OSHA's PEL); (2) based on the analyses of job activities (rather than only on measured levels); and (3) when requested by beryllium-associated workers regardless of exposure level. DOE does not expect that these new provisions will greatly increase the number of workers who wear respirators at DOE sites. Under current practice, DOE sites require use of respirators at their established action level (ranging from 0.2 to 1.0 $\mu g/m^3$) rather than at the PEL (see CBDPP Economic Analysis, Chapter 3, Section 3.2.8).

The NOPR (Section V, Request for Information) requested comments on changing the trigger for requiring respiratory protection from the PEL to the action level. Seven of the thirteen commenters on respiratory protection (Exs. 16, 18, 23, 25, 26, 28, 30) recommended that the rule be more protective of workers' health by requiring the use of respiratory protection at the proposed action level. None of the remaining four commenters on this issue (Exs. 3, 4, 20, 31) recommended retaining the PEL as a trigger. The seven supporters of using the action level as a trigger represent a wide variety of stakeholders. These commenters' predominant reason for recommending the more protective level as the trigger is the uncertainty about the protection afforded by the current PEL. These commenters provided the following additional reasons for lowering the respiratory protection trigger from the PEL to the action level: (1) To provide a greater margin of safety because of the imperfections in measuring exposure levels; (2) to provide a greater margin of safety because of the imperfections in understanding how to set exposure limits for materials, such as beryllium, for which the cause of illness is the body's immune system reaction; and (3) to establish an internally consistent CBDPP which includes consistent triggers for its protective provisions and, therefore, is rational and easy to communicate. DOE generally agrees with these comments and has revised section 850.28 to require the use of respirators when exposures are at or above the action level.

One commenter (Ex. 3) was concerned that using the action level as a trigger for respiratory protection would render the action level a de facto PEL, because OSHA uses the PEL as the trigger for respiratory protection in OSHA substance-specific standards. Similarly, two commenters (Exs. 4, 20) believed that using the action level as a trigger for respiratory protection signifies that DOE believes that the PEL is not adequately protective. Section I.C., Health Effects, of the Supplementary Information section provides a detailed explanation of the difficulties of determining a safe threshold level for occupational exposure to beryllium, given the current state of knowledge of occupational exposures and the etiology of beryllium disease. DOE's strategy is to require a rigorous program to prevent chronic beryllium disease by reducing and minimizing exposures, while studies continue that may provide the data needed to establish a safe level of exposure to airborne beryllium. The preamble discussions of sections 850.22 and 850.23 explain in greater detail DOE's rationale for continuing to defer to OSHA's PEL, while establishing a more protective action level for DOE.

One commenter (Ex. 26) recommended that the responsible employer provide respiratory protection when warranted based upon an analysis of the worker's job activities. DOE recognizes that many tasks involving beryllium may result in high concentrations of airborne beryllium due to a procedure error, a work error, or an equipment failure. An analysis of the worker's job activities will determine whether respiratory protection is necessary for such tasks. Therefore, DOE added section 850.28(b)(2) requiring responsible employers to provide respiratory protection for task involving such circumstances.

Two commenters (Exs. 26, 30) recommended that the responsible employer provide respiratory protection when it is not otherwise required if requested by a worker due to the uncertainty about what is a safe level and uncertainties in monitoring and controlling a substance like airborne beryllium. DOE agrees with these commenters and has added section 850.28(c), which requires the responsible employer to provide respiratory protection upon the request of the beryllium-associated worker regardless of measured exposure levels.

One commenter (Ex. 3) recommended requiring respiratory protection for exposures at or above the STEL. DOE agrees with the commenter that the STEL would have been an appropriate trigger for respiratory protection if the action level had remained at 0.5 $\mu g/m^3$. However, a STEL of 10 $\mu g/m^3$ for 15 minutes, as proposed in the NOPR, would provide no added protection for workers as a trigger for respiratory protection in the final rule because its action level of 0.2 $\mu g/m^3$ will be exceeded in less than 15 minutes where exposure levels are at 10 $\mu g/m^3$. As explained in the discussion of section 850.22, DOE has decided that it would not be appropriate, given the current science, to establish a lower STEL in this rule.

DOE has clarified its expectations on the use of DOE-accepted respirators in response to one commenter (Ex. 31) who questioned the use of DOE-accepted respirators rather than NIOSH-approved respirators. This requirement as proposed in section 850.28(c) could have been interpreted, as it was by this commenter, to mean that responsible employers could choose between NIOSH-approved respirators and DOE-accepted respirators. This was not DOE's intent. DOE's revision in section 850.28(d)(2) clarifies that responsible employers may use the DOE-accepted respirators only if NIOSH-approved respirators do not exist for particular DOE tasks. This section also references DOE's Respirator Acceptance Program to clarify that DOE only accepts for use respirators that DOE deems acceptable based upon the results of a formal testing and evaluation program.

One commenter (Ex. 31) recommended that the rule specify that all respiratory protective equipment be furnished at no cost to the worker. Section 850.28(a) requires that responsible employers comply with 29 CFR 1910.134, Respiratory Protection, which currently requires in section 1910.134(c)(4), that employers provide respirators at no cost to the employee. Accordingly, DOE will continue to rely upon OSHA's requirements in lieu of making specific changes to the rule.

Section 850.29–Protective Clothing and Equipment

Section 850.29 establishes the protective clothing and equipment provisions (other than respirator use) of the CBDPP. The objectives of this section are to provide clothing and equipment that protects workers against the hazards of skin and eye contact with dispersible forms of beryllium and to prevent the spread of contamination outside work areas that could occur from the improper handling of beryllium-contaminated clothing and equipment.

DOE has clarified the proposed requirement for the responsible employer to provide protective clothing and equipment where skin or eye contact with beryllium is possible. Section 850.29(a) requires that responsible employers provide protective clothing and equipment to beryllium workers where dispersible forms of beryllium may contact workers' skin, enter openings in workers' skin, or contact workers' eyes.

The openings in workers' skin could include fissures, cuts, and abrasions. DOE recognizes that the potential for the development of contact dermatitis, chronic ulcerations, and conjunctivitis is mainly associated with contact with soluble forms of beryllium compounds that are not included in the definition of "beryllium" in this rule. Insoluble beryllium, however, has also been shown to cause chronic ulcerations if introduced into or below the skin via cuts or abrasions (ref. 34). DOE believes that it is prudent industrial hygiene practice to avoid skin or eye contact with a material that causes chronic ulcerations and, therefore, has included protecting workers' skin and eyes from contact with insoluble beryllium in section 850.29(a). The protective equipment required by this section could include coveralls, overalls, jackets, footwear, headwear, face shields, goggles, gloves, and gauntlets, depending on the nature of the operation and the related skin and eye exposure hazards involved.

In the NOPR, DOE requested information regarding the presence of soluble beryllium compounds within the DOE complex and the appropriateness of the exclusion of such compounds from the definition of "beryllium" in the proposed rule. In addition, DOE requested comments regarding the need for the protective clothing and equipment provisions of proposed section 850.29(a)(2), given a DOE survey that had found that soluble beryllium compounds apparently were not present within the DOE complex. One commenter (Ex. 4) recommended excluding soluble beryllium from section 850.29 based on that survey result. However, as a result of other public comments, DOE learned that that survey result was incorrect because one DOE commenter (Ex. 16) indicated that its facilities contain soluble beryllium. Moreover, other commenters (Exs. 26, 30) pointed out that DOE facilities may contain soluble beryllium in the future.

Nevertheless, DOE has not changed the definition of "beryllium" in the final rule to include soluble forms of beryllium, because the principal focus of this rule is on preventing CBD, which is caused by exposure to insoluble forms of beryllium. One commenter (Ex. 26) correctly pointed out that the skin and eye effects that this section is intended to prevent are different health effects than CBD. Although another commenter (Ex. 25) questioned DOE's view that soluble beryllium exposure to the lungs does not cause CBD, DOE finds no evidence in the information on health effects presented in section I.C. that exposure of the lungs to soluble forms of beryllium causes CBD. DOE expects responsible employers to address soluble beryllium hazards in existing worker protection programs under DOE Order 440.1 or analogous Orders or standards cited in responsible employers' contracts with DOE.

Section 850.29(a)(1) requires responsible employers to provide protective clothing and equipment to beryllium workers, at no cost, where airborne beryllium levels are measured or presumed to be at or above the action level, because elevated airborne levels are likely to generate elevated surface levels which represent a skin and eye hazard. DOE has included "presumed to be" in section 850.29(a)(1) in response to a recommendation that one commenter (Ex. 26) made with respect to respiratory protection that applies equally to protective clothing and equipment. The commenter recommended that the responsible employer provide respiratory protection when warranted based upon task analyses. DOE recognizes that many tasks involve beryllium that could readily become airborne in high concentrations due to a procedure error, a worker error, or an equipment failure, but which will have no measurable exposure level unless one or more of these problems occur. DOE believes that an analysis of the worker's job activities would show the need for protective clothing and equipment, and respiratory protection to perform such activities.

Another commenter (Ex. 3) recommended that DOE add a surface contamination level that would also trigger the requirement to provide protective clothing and equipment. DOE agrees with this commenter because elevated surface levels represent a skin and eye hazard, and, accordingly, DOE has added paragraphs (a)(2) and (a)(3) to this section. Section 850.29(a)(2) requires responsible employers to provide protective clothing and equipment to beryllium workers where surface contamination levels are measured to be, or prior to initiating work are presumed to be, above the housekeeping level prescribed in section 850.30. Section 850.29(a)(3) requires responsible employers to provide protective clothing and equipment to beryllium workers where surface contamination level results obtained to confirm housekeeping efforts are above the prescribed housekeeping level.

Section 850.29(a)(2) addresses the situation in which the responsible employer is planning to conduct a task involving beryllium and has time to measure or estimate surface levels before the task begins. Section 850.29(a)(3) addresses the situation in which the responsible employer learns from routine surface monitoring conducted at the end of a shift that housekeeping efforts did not reduce surface levels to below the surface contamination level specified in section 850.30. DOE recognizes that sampling to confirm the adequacy of housekeeping efforts at the end of shifts, and the turnaround time of as much as 24 hours for sample analysis, could result in workers not using protective clothing and equipment for more than a day where surface contamination levels exceed the prescribed surface contamination level. However, DOE believes that these situations will be rare, because routine post-shift cleaning should keep these surface contamination levels from becoming excessive. Also, DOE believes that responsible employers will be motivated to reduce turnaround times for analyses in their efforts to reduce and minimize exposures. DOE selected the term "results" in section 850.29(a)(3) to avoid creating a situation in which the responsible employer would violate the rule simply because the employer did not know that the housekeeping criterion had been exceeded until surface monitoring results were available.

Section 850.29(a)(4) requires the responsible employer to provide protective clothing and equipment upon the request of the beryllium-associated worker, regardless of measured exposure levels.

Section 850.29(b) incorporates into this rule 29 CFR 1910.132, Personal Protective Equipment General Requirements. This OSHA standard is responsive to a commenter's (Ex. 31) recommendation that the rule should require the responsible employer to furnish the clothing and equipment at no cost to the employee, and covers other well-established practices, such as the topics to be included in protective clothing and equipment training, and ensuring that protective clothing and equipment fits properly. This requirement to comply with 29 CFR 1910.132 is consistent with the general worker protection provisions of DOE Order 440.1A, and analogous Orders or standards cited in the responsible employer's contract with DOE.

Section 850.29(c)(1) requires the responsible employer to establish procedures for donning, doffing, handling, and storing protective clothing and equipment that prevent beryllium workers from exiting areas that contain beryllium with contamination on their bodies or their personal clothing. DOE added this provision because one commenter (Ex. 3) correctly pointed out that it was omitted in the proposed rule and is needed to ensure that workers do not track contamination out of areas that contain beryllium. The same commenter recommended that DOE explicitly require HEPA vacuuming of contaminated protective clothing and equipment as part of the required doffing procedure. This final rule does not include a requirement to include HEPA vacuuming in doffing procedure, because DOE believes that this would not allow the employer sufficient flexibility in selecting cleaning procedures.

Section 850.29(c)(2) requires that the procedures for donning, doffing, handling, and storing protective clothing and equipment include a requirement that beryllium workers exchange their personal clothing for full-body protective clothing and footwear (work shoes or booties) before beginning work in regulated areas. This change from personal clothes into protective work clothing must occur in a change room that protects the worker's personal clothes and clean protective clothing from beryllium contamination. DOE believes that the use of full-body protective clothing in lieu of personal clothes in regulated areas is necessary to prevent the spread of beryllium contamination into adjacent work areas and to preclude the possible transport of beryllium onto affected workers' private property. A recent study (ref. 35) has documented the transport from work areas of beryllium on workers' hands and inside their personal vehicles.

One of DOE's objectives is to prevent the spread of beryllium contamination, thereby reducing the number of persons exposed and the opportunities for potential exposures. Thus, sections 850.29(d) through (f) establish provisions to control the handling, maintenance, cleaning, and disposal of beryllium-contaminated protective clothing and equipment.

Section 850.29(d) requires the responsible employer to ensure that workers do not remove beryllium-contaminated protective clothing and equipment from areas that contain beryllium, except for authorized activities such as cleaning and repairing the clothing and equipment. DOE replaced "site" in the proposed rule with "area that contains beryllium" in the final rule to clarify its intent to minimize contamination of other areas at the site as well as outside the site.

Section 850.29(e) requires the responsible employer to prohibit the removal of beryllium from protective clothing and equipment by blowing, shaking, or other means that may disperse beryllium into the air. Although DOE generally believes that responsible employers should have the flexibility to determine the most appropriate means to clean contaminated clothes based on their own specific worksite conditions, DOE has included this well recognized and accepted industrial hygiene control to prevent the dispersion of beryllium particles into the workplace atmosphere.

Section 850.29(f), which was proposed as section 850.29(c), requires responsible employers to clean, launder, repair, and replace protective clothing and equipment as needed to ensure its continued effectiveness in protecting workers. This section allows contractors flexibility in determining the required frequency for laundering protective clothing based on specific work conditions and the potential for contamination.

Section 850.29(f)(1), which was proposed as section 850.29(b), paragraphs (1)–(2), requires the responsible employer to ensure that protective clothing and equipment removed for laundering, cleaning, maintenance, or disposal, is placed in containers that prevent the dispersion of beryllium dust, and that these containers are labeled in accordance with section 850.38. These warning labels will help ensure appropriate subsequent handling of beryllium-

contaminated materials and may prevent inadvertent exposures that could result if laundry, maintenance, or disposal personnel are not aware of the beryllium contamination and the precautions prescribed by the responsible employer to prevent the release of airborne beryllium. In section 850.29(f)(1) of the final rule, DOE has deleted the words "impermeable" and "are designed" which were in proposed section 850.29(b)(1) in response to a commenter's (Ex. 8) recommendation to clarify DOE's intent. This change eliminates the possible implication that DOE expects responsible employers to provide special containers even if existing containers are capable of preventing the spread of contamination.

Section 850.29(f)(2), which was proposed as section 850.29(d), requires the responsible employer to ensure that organizations that launder or clean DOE beryllium-contaminated protective clothing or equipment are informed that exposure to beryllium is potentially harmful, and that clothing and equipment should be laundered or cleaned in the manner prescribed by the responsible employer to prevent the release of airborne beryllium. DOE replaced "any individual" with "organizations" to clarify that DOE's objective for this section is to ensure that any organization that launders beryllium contaminated clothing is informed of the hazards of handling beryllium contaminated items so that the organization can take steps to protect its workers. The proposed wording "any individual" could have been interpreted as establishing a direct relationship between the responsible employer that generated the contaminated clothing and the employee of the laundry or cleaning organization, which is not DOE's intent. Also, DOE clarifies in section 850.29(f)(2) that this section requires informing both on-site cleaning and laundry services, as well as off-site cleaning and laundry vendors. On-site cleaning and laundry services are covered by this rule, but may not know about the presence and hazards of beryllium on the clothing and equipment unless the responsible employer informs them.

DOE has deleted the words "at or above the action level or above the STEL," which in proposed section 850.29(a) qualified the requirement to inform downstream launderers or cleaners of beryllium-contaminated protective clothing and equipment. This change is consistent with final section 850.25, which requires reduction and minimization, if practicable, where exposure levels are below the action level.

One commenter (Ex. 31) recommended including in the rule provisions for preventing heat stress. DOE recognizes that requiring protective clothing and equipment for dispersible forms of beryllium compounds at the final rule's lower action level is likely to result in greater use of protective clothing and equipment, including respirators, and consequently greater potential for heat stress. DOE believes that the health benefit from lowering the risk of CBD outweighs any increased health risk caused by heat stress that results from the requirements of this section. DOE has not included heat stress provisions in this rule because it is a potential problem for many DOE activities that require the use of protective clothing and equipment; and DOE expects heat stress issues to be addressed in the responsible employer's existing worker protection program.

Section 850.30—Housekeeping

Section 850.30 establishes the housekeeping provisions of the CBDPP. Good housekeeping practices are necessary in operational areas where beryllium is used or handled, to prevent the accumulation of beryllium contamination on surfaces throughout the workplace. Such accumulations, if not controlled, may lead to the spread of beryllium contamination on surfaces and the re-suspension of beryllium particles into the air, both in the area where beryllium dusts were originally generated and in other work areas. In addition, the uncontrolled accumulation of beryllium-contamination on equipment in the workplace increases the potential for worker exposure to beryllium during the performance of equipment maintenance, handling, and disposal tasks.

DOE in section 850.30(a) has established that the removable contamination housekeeping level on surfaces must not exceed 3 μ/100 cm^2 during non-operational periods. Establishing a surface removable contamination limit reduces the potential for spread of beryllium contamination. Responsible employers must perform measurements to determine if the operational work area is in compliance with the rule. In addition, monitoring surface contamination levels is an indispensable tool for ensuring that beryllium emissions from operations are under control. The only practical method of monitoring surface levels is to maintain the surface contamination at an established housekeeping level so that elevations above that level can readily be detected.

The performance of housekeeping tasks can, in and of itself, lead to worker exposures to beryllium-contaminated dust. Therefore, the housekeeping section also seeks to prevent the spread and re-suspension of dust during housekeeping activities.

Two commenters (Exs. 26, 28) questioned the scientific basis for establishing a 3 μg/100 cm^2 surface removable contamination level. In addition, these two commenters stated that the variability associated with wipe sampling makes surface sampling method an unreliable method for sampling. DOE views wipe sampling as a useful and accepted method for providing qualitative information on chemical contamination of work surfaces, and agrees with the following statement in the OSHA Technical Manual (Section II: Chapter 2, Sampling for Surface Contamination): "Wipe sampling is an important tool of work site analysis for both identifying hazardous conditions, and in evaluating the effectiveness of * * * housekeeping, and decontamination programs." Accordingly, this requirement is intended only as a housekeeping performance measure, and should not be viewed as a mechanism for measuring, or predicting airborne concentrations of beryllium. In addition, this requirement only applies to removable or loose surface contamination, which could become re-suspended in the workplace air or spread to non-controlled areas.

DOE does not intend the requirement for surface wipe sampling in this rule to preclude the use of other surface sampling methods for measuring beryllium contamination. DOE agrees with comments calling for more research (Exs. 16, 28) and encourages the use, research, and development of new technologies such as direct reading instruments, which may provide better results than wipe sampling.

Section 850.30(a) requires that responsible employers conduct routine surface sampling in operational areas, to ensure the effectiveness of their housekeeping efforts. This sampling would not include the interior of installed closed systems such as enclosures, glove boxes, chambers, or ventilation systems. Sampling should not be carried out during a normal work shift, but rather it should be undertaken after normal clean-up and during non-operational periods.

Affected sites throughout DOE have already established, under the interim CBDPP, allowable beryllium surface contamination levels to ensure the

effectiveness of their housekeeping procedures. These levels range from 1 to greater than 5 μg/100 cm², with the majority of the sites using approximately 3 μg/100 cm² or less as the criterion for determining the cleanliness of their working environment outside of regulated areas. Comments on the NOPR called for setting levels ranging from less than 1 μg/100 cm² (Exs. 14, 18) to 5 μg/100 cm² (Ex. 24). Information collected from the sites during the development of the interim beryllium CBDPP indicated that the Pantex and Y–12 facilities currently have an allowable surface concentration level of 25 μg/100 cm² for regulated areas. Los Alamos National Laboratory (LANL) procedures call for re-evaluation of the operations with additional cleaning of beryllium operations areas at levels greater than 26 μg/ft² (2.8 μg /100 cm²). Lawrence Livermore National Laboratory (LLNL) indicated those areas with surface concentrations greater than 3 μg/100 cm² are designated as regulated areas. Rocky Mountain Remediation Services (a sub-contractor at Rocky Flats) indicated that a surface contamination level greater than 25 μg/ft (2.7 μg/100 cm²) outside of regulated areas triggers clean up actions at its site. The AWE facility at Cardiff (United Kingdom) has utilized a surface action level of 10 μg/ft² (1 μg/100 cm²) outside of regulated areas since 1990. Based on this range of data, DOE adopted the 3 μg/100 cm² housekeeping level in the proposed rule and continues to believe it is a reasonable surface removable contamination level that should not be exceeded.

One commenter (Ex. 3) recommended that the surface removable contamination level be the same level as the criterion for releasing contaminated equipment for other uses. Another commenter (Ex. 23) objected to establishing a single surface limit for removable beryllium contamination that would be both a housekeeping and release level, recommending instead a tiered approach, with different levels for normal or safe work conditions (and free release of equipment), for beryllium work, and for special work conditions. For the reasons discussed under section 850.31, Release Criteria, DOE has adopted different levels for the release of equipment that depend on the intended future use of the equipment.

One commenter (Ex. 24) expressed concern that certain beryllium oxide weapons components could not meet the 3 μg/100 cm² level, and recommended that weapons components be exempt from surface contamination limits. DOE has revised section 850.30 to clarify that the surface removable contamination level is to be measured post-shift, and that the purpose of the surface level is not to have an absolute value of 3 μg/100 cm² at all times during the machining or working with beryllium or beryllium parts. DOE is aware that it may not be possible to maintain surface levels of beryllium in an operational work area below the 3 μg/100 cm² limit at all times. Again, the surface removable contamination level is intended as a post-shift measure of the effectiveness of routine housekeeping efforts.

DOE emphasizes that the housekeeping concerns addressed by section 850.30 apply to areas where workers may be exposed to beryllium, not to closed-off rooms or buildings. To make this clear, DOE has added the term "operational areas" in section 850.30(a). If routine surface sampling during non-operational or post-shift periods shows that the removable contamination level has been exceeded, clean-up measures must be instituted.

DOE agrees with the comment (Ex. 28) that the meaning of the term "removable" contamination may not be clear. Therefore, DOE has added a new definition of "removable contamination" and deleted the definition of "surface contamination" in section 850.3. The definition of "removable contamination" is taken from the U.S. Department of Energy Radiological Control Manual (DOE/EH–0256T Revision 1, April 1994). Use of this language in this rule maintains a consistent approach with DOE's radiological surface sampling program.

Two commenters suggested the use of wet wipes for surface sampling, while another commenter (Ex. 24) indicated that there is no basis for the application of a wet method. NIOSH, in its recent publication on beryllium contamination inside worker vehicles, supports the use of a wet wipe sampling method to collect beryllium samples in potentially contaminated employee vehicles (ref. 35).

The use of diverse sampling methods (e.g., differences in type of sample media, type of solvent (if any) on the sample media, area sampled, etc.) may easily lead to the reporting of inconsistent results. To reduce the variability in reported surface contamination across the DOE complex, DOE recommends, but does not require, the use of a single sampling method: NIOSH method 9100 (NIOSH Manual of Analytical Methods, 4th Edition, August 15, 1994, Lead in Surface Wipe Samples). This method may have to be modified for surfaces smaller than 100 cm² using a procedure such as that described in Appendix D of 10 CFR part 835. Sites using other methods, e.g., dry wipe sampling, should transition to the NIOSH method in a cost-effective manner. Current data is not clear on the relative efficiency of dry verses wet sampling on the variety of surfaces found in the DOE. Therefore, immediate adoption of the NIOSH method at sites across DOE may be impractical and add no immediate value to worker health and safety. In the long term, by recommending a single method (a wet method) for conducting the surface sampling, DOE believes that the variability associated with surface sampling will be reduced without specifying a particular method in the rule.

One commenter (Ex. 3) suggested that the term "routine" in section 850.30(a) should be more clearly defined, i.e., weekly or monthly. Because DOE believes that this rule should be as performance-based as possible, the frequency of "routine" monitoring procedures under this section should be developed by the local health and safety specialist (industrial hygienist) based on the specific circumstances at the site.

Section 850.30(b) prohibits the use of compressed air or dry methods and requires the use of vacuuming, wet or similar methods for the cleaning of beryllium-contaminated floors and other surfaces. The purpose of using these methods is to reduce or eliminate the potential for re-suspension of beryllium dust into the air and breathing zone of the worker.

One commenter (Ex. 23) requested flexibility in cleaning methods, such as permitting the use of sticky tack cloths. DOE agrees with the comment and in the final rule has allowed the use of other cleaning methods, such as sticky tack cloths, that have the same end result as wet vacuuming (i.e., a reduction of dust-producing cleaning methods). These are appropriate methods for complying with the housekeeping requirement of the rule.

Section 850.30(c) requires the use of HEPA filters in all vacuuming operations used to clean contaminated or potentially contaminated surfaces, and further requires filter replacement as needed, to maintain the capture efficiency of the vacuum system. The use of wet methods for reducing or minimizing the dispersal of dust during general housekeeping tasks, such as sweeping, is a common industrial hygiene practice. HEPA filters must be used to prevent the spread of dust by effectively collecting the dust that is collected by vacuum systems. Responsible employers should have procedures for the cleaning or replacement of filters that ensure

minimum employee exposure to beryllium dust on the filter.

As discussed in earlier sections of this analysis, the movement of contaminated equipment from a regulated area to a nonregulated area may result in the spread of beryllium contamination to the nonregulated area. To prevent the potential spread of contamination from the performance of housekeeping activities required by this rule, section 850.30(d) requires that cleaning equipment used in areas where surfaces are contaminated or potentially contaminated with beryllium be labeled, controlled, and not used for other, non-hazardous materials. These procedures are similar to those required under OSHA's asbestos standard for equipment used during cleanup or removal of asbestos from buildings.

Section 850.31—Release Criteria

Section 850.31 establishes beryllium contamination levels and other requirements that must be met before equipment and other items used in beryllium work areas may be released or transferred to the general public and non-beryllium areas of DOE facilities, or to facilities engaged in work involving beryllium. DOE requested comments on the setting of "beryllium free-release" public contamination levels in the NOPR. After considering the comments received in response to this broad request for views and information, DOE reopened the comment period on June 3, 1999, to invite public comment on specific options for release criteria that were being considered by DOE (64 FR 29811). Section 850.31 reflects DOE's consideration of the substantial number of comments received from organizations and individuals on this topic.

In the notice of reopening of the comment period, DOE suggested that a reasonable contamination level for release of equipment and other items to the public for non-beryllium uses would be 0.1 μg/100cm². This level was based on the housekeeping and release levels believed to be in effect at various DOE facilities and the AWE facility in the United Kingdom. DOE also stated that it was inclined to adopt a contamination level of 3 μg/100 cm² for release of items for beryllium work in other facilities. This level was based principally on the practice at the Rocky Flats.

Ten organizations and individuals submitted comments that recommended release level values. These values ranged from non-detectable to 3 μg/100 cm² for public release and non-detectable to 10 μg/100 cm² for release to beryllium facilities.

One commenter (Ex. 47) stated that there should be a single contamination level for both the housekeeping standard for beryllium areas and for release of items for beryllium and non-beryllium uses. Another commenter (Ex. 43) urged DOE to adopt a single criterion for release to the public and DOE non-beryllium facilities and to beryllium-handling facilities because it would be simpler to administer. DOE does not agree with these comments, because the workers in operational areas where beryllium is used have been trained in the hazards of beryllium and the proper use of protective equipment that is required to be worn in those areas. DOE does not believe that the general population or DOE non-beryllium workers should be exposed to the same level of a hazardous material as workers who have been trained in the safe handling of that material. DOE, therefore, has included in the rule separate requirements for the release of beryllium-contaminated equipment and other items to facilities engaged in beryllium work and for releases to the general public or DOE non-beryllium facilities.

Section 850.31(a) requires the responsible employer to clean beryllium-contaminated equipment and other items to a contamination level that is as low as practicable, but not to exceed the removable contamination levels specified in section 850.31(b), for release to the general public or to non-beryllium areas of DOE facilities, and section 850.31(c), for release to facilities performing work with beryllium. In addition, DOE has included in these sections other requirements that are designed to protect workers and others from the hazards associated with exposure to beryllium. DOE uses the words "and other items" after "equipment" in section 850.31(a) to cover tools, supplies, documents, etc., and any personal property in beryllium-handling areas that may not be encompassed by the term "equipment." The phrase "equipment and other items" does not include real property or buildings.

Release to the public and for use in DOE non-beryllium areas. Section 850.31(b)(1) sets the removable contamination level for equipment and other items to be released to the general public or for use in DOE non-beryllium work areas at 0.2 μg/100cm² or the concentration level of beryllium in soil at the point of release, whichever is higher. The equipment also must be labeled, in accordance with section 850.38(b), to warn recipients of potential beryllium hazards. The responsible employer must condition the release of equipment and other items to the public based on the recipient's commitment to implement controls to ensure that exposure does not occur. Such a commitment should be based on the nature and possible future uses of the equipment and other items, the nature of the beryllium contamination, and whether exposure to beryllium is foreseeable.

In the notice of reopening, DOE referenced a comment by the AWE (Ex. 1) which reported that the housekeeping surface action level in its Cardiff, Wales facility had been reduced to 1 μg/ft² (about 0.1 μg/100 cm²) in 1990. DOE reasoned that, based on the AWE experience and release limits included in DOE facilities' interim CBDPPs, a public release limit as low as 0.1 μg/100 cm² would be achievable. Several commenters (Exs. 41, 43, 46, 47, 51) argued that this level would be difficult and costly to achieve, and that there is no technical basis for concluding that it would be more beneficial than a higher level. AWE (Ex. 38) commented that it is not using 0.1 μg/100 cm² as a release level; its current policy is to dispose of contaminated items in a landfill site. The Pantex Plant (Ex. 46) stated that its reported use of 0.1 μg/100 cm² as a release criterion was incorrect, possibly due to a typographical error, and it recommended using 3 μg/100 cm² for the public release limit. Rocky Flats (Ex. 47) pointed out significant differences between the AWE Cardiff facility, which is a stable work environment, and the Rocky Flats facility, which is engaged in decontamination and decommissioning work. Two commenters (Exs. 43, 46) argued that a surface removable contamination level of 0.1 μg/100 cm² could easily be exceeded by background levels of beryllium.

Other commenters (Exs. 44, 45, 48, 49) took the position that any detectable level of beryllium on the surface of an item should be presumed to present a health risk and, therefore, that no item having a detectable level of beryllium should be released to anyone for any purpose. One commenter (Ex. 48) stated that the correlation between surface beryllium levels and associated health hazards is unknown, and the possibility exists for fixed or inaccessible beryllium to be liberated when equipment is worked on or repaired. Another commenter (Ex. 49) stated that DOE should take a cautious stance because of the current lack of information regarding the nature of the exposure-response relationship and the factors that underlie individual sensitization towards beryllium. Two commenters (Exs. 49, 52) recommended life-cycle

administrative controls for beryllium-contaminated equipment.

Section 850.31(b)(3) responds to the recommendation of comments (Exs. 26, 38) calling for a risk assessment that considers the downstream user's exposure potential, the history and type of equipment, and the nature of the contamination, in order to decide whether and how to release equipment and other items for non-beryllium uses. As recognized by DOE in the reopening notice, surface or wipe sampling is not an adequate means of characterizing potential exposure risk. For example, a lathe or other piece of equipment released because it is determined to be beryllium-free on the surface may contain internal beryllium dust that could become airborne and present a health hazard during future maintenance. On the other hand, other types of equipment may contain internal beryllium that is combined with other substances (e.g., grease) which would make it unlikely that the beryllium would ever become airborne. The presence of this type of suspended contamination, even at levels above the surface release criterion, would not necessarily present a health hazard. Accordingly, an assessment of potential risk of exposure should be undertaken before the release of any equipment or other item to either the general public or to DOE for non-beryllium uses. Based upon the assessment, the decision should be made as to ultimate disposition of the equipment and any conditions that should be placed on its future use.

After considering the comments, DOE is persuaded that it would be costly, if not infeasible, to implement a contamination level of 0.1 μg/100 cm² or lower as the public release criterion. Section 850.31(a)(1) requires responsible employers to clean equipment and other items to the lowest contamination level practicable and to ensure that removable contamination on surfaces does not exceed 0.2 μg/100 cm² or the concentration level of beryllium in local soil. This removable contamination criterion is based, in large measure, on information provided in comments submitted by the contractor that manages the Rocky Flats facility (Ex. 47). To comply with the interim CBDPP established by DOE Notice 440.1, Rocky Flats conducted an extensive site characterization (over 6000 samples) using 0.2 μg/100 cm² as the target contamination level. Rocky Flats reported that they found the 0.2 μg/100 cm² to be an achievable level and determined (using recently published re-suspension factors) that any airborne beryllium generated from re-suspending beryllium from surfaces, even with some beryllium surface levels above 0.2 μg/100 cm², would be expected to be well below the EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) limit of 0.01 μg/m³ and therefore, at safe levels. EPA's NESHAP is the national standard for community air that the population continuously breathes.

DOE has addressed the concerns of commenters (Exs. 46, 50) that it may not be possible to clean equipment and other items to below the natural background of beryllium in local soil. It is highly unlikely that this rule would apply to soil because soils generally contains less than 0.1 percent beryllium and, therefore, is not considered beryllium for the purposes of this rule. Nonetheless, DOE included in section 850.31(b)(3) the words "or the concentration level of beryllium in local soil at the point of release" to eliminate the possibility that the rule would compel a responsible employer to clean local soil off of equipment and other items before release.

DOE does not agree with the view of some commenters that, in the absence of scientific evidence of a threshold or "safe" level of exposure to beryllium, the surface contamination release level should be at the limit of detection or zero. Although one commenter (Ex. 45, 45B) submitted information indicating that re-suspension of beryllium in the air is possible on surfaces with less than 1.0 μg/100 cm² of beryllium, there currently is no scientific evidence that surfaces cleaned to that level would result in airborne concentrations of beryllium at levels that would be harmful to workers.

DOE has addressed the concern about the potential for exposure to re-suspended beryllium by requiring a case-by-case assessment of risk before equipment and other items are released for non-beryllium uses. There is likely to be wide variation in these situations, and DOE is not prepared at this time to prescribe uniform management controls. However, this is an area for which DOE may develop guidance to assist field elements, as experience is gained under this rule.

One commenter (Ex. 43) recommended establishing a general surface release level of 1 μg/100 cm², plus labeling of items. The commenter suggested the use of labels to shift responsibility for controlling future exposures to the recipients of the equipment or items. DOE does not believe that simply cleaning the outside of the equipment and other items and providing warning to the new user is adequate because some recipients, particularly recipients who have not performed work using beryllium, may not fully understand the risks associated with beryllium exposure.

Release for beryllium work. Section 850.31(c)(1) sets the contamination level for equipment or other items released for use in other facilities engaged in beryllium work at 3 μg/100 cm². The equipment or item also must be labeled in accordance with section 850.38(b). Section 850.31(c)(3) requires the responsible employer to ensure that a released item is enclosed or placed in sealed, impermeable bags or containers to prevent exposure to beryllium during handling and transportation to its destination. Enclosure of equipment and other items to be released to other beryllium operations can be accomplished by any practical means, such as wrapping in plastic.

Several commenters recommended that DOE establish a higher surface contamination release level for equipment and other items to be transferred to another facility for beryllium work than is allowed for items released to the public or for use in DOE non-beryllium work (Exs. 38, 41, 42, 46, 51). Surface contamination levels recommended by the commenters (see Table 9) for release of equipment and other items to be used in beryllium areas range from 0 and non-detectable to 10 μg/100 cm². Rocky Flats (Ex. 47) previously established a release level for equipment and other items to be transferred to other DOE facilities for beryllium work at 2.5 μg/100 cm². Several commenters (Exs. 41, 42, 51) and a number of the DOE sites reporting release levels support the use of 3 μg/100 cm² or less as a release level for equipment and other items that will be used for beryllium work.

Based upon current surface sampling technology, DOE sees no appreciable difference between 2.5 μg/100 cm² and 3 μg/100 cm² and, therefore, has adopted the 3 μg 100 cm² value for release of equipment and other items to other facilities for beryllium work. Adoption of this value also maintains a consistency with the housekeeping requirements for operational beryllium areas, which will simplify implementation by DOE facilities.

Other issues. One commenter (Ex. 51) recommended that the rule specify that an industrial hygienist should determine the number and location of swipe samples. DOE views the determination of the number and location of swipe samples to be part of the hazard assessment, which must be managed by a qualified individual such as a CIH (see discussion for section 850.21).

Two commenters (Exs. 49, 50) were concerned with dermal exposures to beryllium. DOE agrees that there is a potential health hazard associated with dermal exposure to beryllium, and has imposed requirements under sections 850.29 and 850.37 to protect workers handling beryllium. The hazards associated with dermal exposures also are dealt with in the DOE facilities' health and safety programs under DOE Order 440.1A or, analogous Orders or standards cited in responsible employers' contract with DOE.

Section 850.32—Waste Disposal

Section 850.32 (proposed as section 850.31) establishes the waste disposal provisions of the CBDPP. Like many of the provisions of the rule (e.g., regulated areas, protective clothing and equipment, and housekeeping), the waste disposal provisions are designed to minimize the spread of beryllium contamination throughout the facility or beyond the sites boundaries.

DOE believes that the most effective way to control the spread of contamination resulting from waste disposal activities is to prevent or minimize the generation of beryllium waste. Accordingly, section 850.32(a) of the final rule requires responsible employers to employ waste minimization principles in conducting beryllium activities. Good housekeeping practices, required by section 850.30, aid in this effort by continually removing beryllium dust accumulations from work surfaces, thereby reducing the level of contamination of workplace equipment. The performance of hazard analyses on operations with the potential to generate wastes, as required by section 850.21, can help responsible employers identify potential sources of wastes and evaluate possible controls that could be implemented to prevent or reduce waste generation. Other waste minimization practices, such as minimizing the equipment and material that is exposed to beryllium contamination, will also assist in reducing the amount of material that must be disposed of as beryllium or beryllium-contaminated waste, thus reducing the potential beryllium exposure hazards.

Section 850.32(b) of the final rule requires responsible employers to dispose of beryllium-containing waste, and beryllium-contaminated equipment and other items that are disposed of as waste, in sealed impermeable bags, containers, or enclosures that are labeled in accordance with section 850.38. Enclosure can be any practical mechanism for sealing, such as wrapping in plastic. DOE believes these waste disposal provisions are necessary to prevent the re-suspension of beryllium contamination into the workplace atmosphere. Warning labels are necessary to ensure that workers are aware that bags, containers, or enclosures contain beryllium so that they can take appropriate precautions. Furthermore, responsible employers must comply with applicable Federal, state, and local regulations governing the management, transportation, and disposal of waste that contain beryllium.

DOE received two comments regarding the waste disposal provisions of the NOPR. One commenter (Ex. 31) applauded DOE for including waste minimization principles as a control measure for reducing beryllium exposures. This commenter suggested that DOE consider developing a non-mandatory appendix to the rule or stand-alone guidance to illustrate waste minimization principles and provide ideas for workers and employers. DOE recognizes the utility of non-mandatory guidance in assisting responsible employers in implementing certain mandatory requirements of the CBDPP. DOE notes, however, that the U.S. Environmental Protection Agency and other Federal agencies have already developed a wide variety of guidance materials addressing waste management, waste minimization, and pollution prevention principles and practices. Not only are these guides readily available to the DOE community, but many DOE sites have used these guides to develop their own hazardous waste management plans. For this reason, DOE believes that the development of an additional guidance document to address waste minimization principles for the final CBDPP rule is not necessary. DOE is developing an implementation guide for the CBDPP rule that will provide general guidance for disposal of beryllium waste.

The other commenter (Ex. 18) suggested that the waste disposal provisions should address the declassification of beryllium parts that are classified for national security purposes at certain DOE sites. This section of the final rule requires responsible employers to control the generation of beryllium-containing waste, and beryllium-contaminated equipment and other items that are disposed of as waste and to dispose of this equipment and other items in a safe manner. DOE does not intend for these provisions to alter or affect the classification of beryllium-contaminated equipment and other items, nor to supersede the applicable requirements for protection of such equipment and items. Accordingly, beryllium-contaminated materials that are classified must be handled in accordance with the governing national security regulations, standards, and policies. Responsible employers also must dispose of such materials in accordance with the provisions of this rule.

Section 850.33—Beryllium Emergencies

Section 850.33 (proposed as section 850.32) establishes the beryllium-related emergency provisions of the CBDPP. Such provisions are particularly important in light of the possibility, suggested by several commenters, that a single, high-level beryllium exposure may have been the cause of CBD occurring among several workers thought to have had no exposure or only incidental, low-level exposures to beryllium.

Proposed section 850.32 would have established broad performance-based provisions requiring responsible employers to develop procedures for responding to and alerting workers to beryllium emergencies, to ensure the availability and use of appropriate protective equipment during related cleanup operations, and to provide emergency response workers with appropriate training on proper response procedures.

Two commenters (Exs. 11, 31) responded to the proposed beryllium emergencies section, and both requested that DOE provide additional guidance regarding beryllium emergency procedures, training, and personal protective equipment requirements. One commenter (Ex. 31) suggested that this guidance was needed to ensure a consistent and coordinated response to beryllium emergencies in cases in which workers from different employers respond to the same event. Both commenters suggested that DOE consider incorporating elements of the emergency response provisions of OSHA's Hazardous Waste Operations and Emergency Response standard (29 CFR 1910.120) in the CBDPP rule.

DOE agrees with the commenters, and notes that the beryllium emergencies provisions of the NOPR were not intended to supersede the applicable provisions of 29 CFR 1910.120. Accordingly, to avoid confusion and duplicative efforts and to ensure consistent and coordinated responses to beryllium emergencies at DOE facilities, DOE has revised the beryllium emergencies section (renumbered section 850.33 in the final rule) to require responsible employers to comply with 29 CFR 1910.120(l) for

emergency response activities related to hazardous waste cleanup operations, and 29 CFR 1910.120(q) for emergency response activities related to all other operations. Also, DOE will provide general guidance on preparing for, and responding to, emergencies involving beryllium in the DOE implementation guide for this rule.

Section 850.34—Medical Surveillance

Section 850.34 (proposed as section 850.33) establishes the medical surveillance provisions of the CBDPP. These provisions are aimed at: (1) Identifying workers at higher risk of adverse health effects from exposure to beryllium; (2) preventing beryllium-induced disease by linking health outcomes to beryllium tasks; and (3) making possible the early treatment of beryllium-induced disease.

Several changes have been made to the medical surveillance provisions as proposed. These changes include enlarging the scope of the covered population to include former beryllium workers who are still employed at DOE facilities in non-beryllium work; adding the term "beryllium-associated worker," which includes all current workers who have or had the potential for exposure to beryllium; adding a multiple and alternate physician review process; deleting the requirement that exposure be at or above the action level before initiating medical surveillance; and deleting the requirement for Office of Environment, Safety and Health review of the written medical surveillance program. In addition, DOE has made editorial changes to clarify various provisions.

The medical surveillance program is designed to ensure the prompt identification, and makes possible the proper treatment, of workers who become sensitized to beryllium or develop CBD. In addition to determining the incidence of CBD in the workforce, the medical surveillance program fulfills a critical information development function, including identifying the risk factors associated with the development of CBD and beryllium sensitization. This rule requires that medical surveillance be given to workers who are at the greatest risk from continued exposure. This determination should be made on the basis of the air monitoring results, the SOMD's recommendation, and any other relevant information the responsible employer may possess, such as past medical or air monitoring records, workers' job tenure, etc.

DOE realizes that some workers may elect not to participate in the medical surveillance program because they believe that a diagnosis of CBD or beryllium sensitization could have a negative impact on future employment opportunities or on their health insurance. In light of this concern and DOE's desire to maximize worker participation in the medical surveillance program, DOE in the NOPR requested interested parties to comment on the feasibility and utility of including anonymous testing as a provision in the final rule. In requesting public comment, DOE noted two concerns it had regarding the use of anonymous testing; specifically, concern about DOE's inability to correlate collected exposure data to health outcomes for workers choosing anonymous testing, and concern about the effect of anonymous testing on DOE's ability to conduct follow-up tests to confirm positive Be-LPT results.

Eight commenters (Exs. 4, 16, 17, 23, 26, 28, 30, 31) responded to DOE's request for information regarding anonymous testing. Most commenters stated that anonymous testing would not provide significant additional benefits or protection for workers. In addition, all of the commenters shared DOE's concerns regarding the resulting inability to correlate collected exposure data to health outcomes, and the difficulty of tracking employees for follow-up testing to confirm positive results. The commenters believed that these two drawbacks overshadow any potential increase in worker participation.

One commenter (Ex. 17) expressed concern that the use of anonymous testing would limit the employer's ability to provide support to workers receiving medical surveillance. This commenter noted that ongoing support and reassurance is essential for those workers with positive or inconclusive test results. Three commenters (Exs. 16, 23, 26) stated that medical surveillance should be used to determine workplace exposures and evaluate the effectiveness of workplace controls. These commenters believe that anonymous testing would hamper this effort by preventing responsible employers from identifying specific jobs or tasks that lead to beryllium-related health effects.

For reasons stated in the NOPR and expressed by all eight commenters, DOE has decided against the use of anonymous testing. However, DOE has taken steps in the final rule to protect the privacy of beryllium-associated workers, e.g., by requiring the use of unique identifiers (see discussion of section 850.39). DOE cannot responsibly accomplish the tasks of ameliorating the effects of exposure to beryllium and developing needed data on the cause and development of CDB through anonymous testing. DOE also believes that offering anonymous testing as a supplement to identified testing would discourage workers from participating in identified testing. Accordingly, provisions for anonymous testing are not included in the final beryllium rule.

Section 850.34(a)(1) requires responsible employers to establish and implement a medical surveillance program for beryllium-associated workers. DOE adheres to its view that participation in the medical surveillance program should not be mandatory for workers. The responsible employer's obligation is to offer to provide the medical tests and procedures as required. DOE expects that where worker confidence in the medical program exists, refusal to participate will be minimal.

The term "beryllium-associated worker" is used in the final rule where DOE has determined that coverage of provisions should not be limited to current workers regularly employed in DOE beryllium activities. Use of the term "beryllium-associated worker" will increase the population eligible to receive medical surveillance by including current workers with past beryllium exposures or potential for exposures.

Numerous commenters (Exs. 2, 3, 4, 14, 16, 17, 28, 30, 29, 31) made recommendations regarding the level of employee exposure that should trigger worker participation in the medical surveillance program. Two of these commenters (Exs. 3, 4) objected to offering medical surveillance to all workers potentially exposed to beryllium. However, their reasons for not wanting to include all potentially exposed workers differed. One commenter (Ex. 3) stated that placing all potentially exposed employees in the medical surveillance program would be inconsistent with the permissible exposure limit. The other commenter (Ex. 4) was concerned with the costs associated with such a strategy, and the potential for causing worker anxiety from false-positive Be-LPT test results for workers with limited exposure potential. While these commenters agreed that some level of worker beryllium exposure should trigger the medical surveillance program, neither provided recommendations for an appropriate trigger level.

One commenter (Ex. 16) suggested that DOE use a graded approach to the medical surveillance program which would include current beryllium workers and other workers with exposures or potential exposures at or above the action level. DOE has

determined that a graded approach linked to exposure at or above the action level would not ensure the necessary surveillance of all DOE and contractor workers who may have had exposure to beryllium, whether current or past.

Several commenters (Exs. 2, 14, 16, 17, 28, 29, 30, 31) favored the inclusion of all potentially exposed workers in the medical surveillance program regardless of the measured exposure level. These commenters argued that medical surveillance should not be limited to workers exposed to levels of beryllium at or above the action level, but rather should include all workers with the potential for any beryllium exposure. Three of these commenters stated that current scientific evidence does not indicate a "safe" level of beryllium exposure, and that CBD has been identified in individuals thought to have only low or incidental exposure to beryllium. Their concern was that restricting medical surveillance to "beryllium workers," as defined in proposed section 850.3, would exclude such workers, who in their view are also at risk of contracting CBD. In addition, two of the commenters (Exs. 28, 30) noted that allowing workers exposed at any level to participate in the medical surveillance program would act as an incentive for employers to minimize the number of individuals who work in beryllium areas.

Similarly, three commenters (Exs. 28, 29, 31) argued that current workers with past beryllium exposures should be offered the opportunity to participate in the medical surveillance program. One commenter (Ex. 31) noted that, based on the proposed definition of "beryllium worker," medical surveillance would not be made available to current workers with past beryllium exposure unless they were covered under the medical removal provisions of proposed section 850.34. Another commenter (Ex.15) suggested that all employees at DOE facilities, even those with no exposure to beryllium, should be given the option of participating in the medical surveillance program.

Several commenters (Exs. 2, 16, 28, 31, 19) raised the issue of medical surveillance for former workers with past beryllium exposures who no longer work at a DOE facility. The commenters stated that former DOE workers should also be provided the opportunity to participate in medical monitoring. They acknowledged DOE's proposed establishment of a separate, directly funded program that offers medical examinations to former workers at risk of developing CBD. However, two of the commenters (Exs. 16, 31) argued that this program should be made available to former workers at the same time as the program for current workers. Another commenter argued that maintaining two separate databases and programs was not practical.

DOE has revised the final rule to require responsible employers to provide medical surveillance for all beryllium-associated workers. DOE based this revision on the beryllium cases suggesting that low and even incidental exposure to beryllium can lead to sensitization or beryllium disease. This approach will ensure the early identification of workers at risk of health effects from exposure to beryllium, provide the greatest protection of worker health, and provide a more complete documentation of beryllium exposures. Beryllium-associated workers eligible for medical surveillance include any current worker who is exposed or was exposed or potentially exposed to airborne concentrations of beryllium at a DOE facility. Thus medical surveillance will be available to a beryllium worker (as defined in section 850.3), a current worker whose work history shows that the worker may have been exposed to airborne concentrations of beryllium at DOE facilities, a current worker who exhibits signs and symptoms of beryllium exposure, and a worker who is receiving medical removal protection benefits.

Section 850.34(a)(2) requires responsible employers to designate a Site Occupational Medical Director (SOMD) who will be responsible for administering the medical surveillance program. One commenter (Ex. 18) stated that a panel comprised of individuals representing management, labor, the public, and the local medical community should select the SOMD. DOE has not adopted this recommendation because DOE believes that the responsible employer must have ultimate responsibility for ensuring compliance with this requirement.

A number of commenters (Exs. 12, 14, 20, 23) were concerned about the quality of health care for workers with CBD and, more specifically, whether or not workers would have a choice of physicians. One commenter (Ex. 20) pointed out that OSHA no longer restricts the performance of medical evaluations to licensed physicians because this requirement is too prescriptive and fails to recognize the realities of today's health care system. This commenter suggested adding a provision to include other licensed health care professionals among those who may perform medical evaluations.

DOE agrees with this commenter and has revised section 850.34(a)(3) of the final rule to require responsible employers to ensure that all medical evaluations and procedures are performed by or under the supervision of a licensed physician who is familiar with the health effects of beryllium. Although a licensed physician is the appropriate person to supervise and evaluate a medical evaluation, certain required elements of the evaluation may be performed by another, appropriately qualified person under the supervision of the physician. The licensed physician is required to be familiar with the health effects of beryllium. DOE expects that the medical evaluations and procedures required to diagnose CBD will be performed or validated by a specialist in pulmonary medicine, occupational medicine, or other physician with specialized equipment and examination protocols required to definitively differentiate between CBD and other lung diseases. DOE believes that this is necessary due to the unusual nature of CBD and the fact that not all physicians are familiar with the evaluation of beryllium-associated patients.

Three commenters (Exs. 15, 18, 22) expressed concern about certain language in the NOPR preamble that they interpreted to mean that workers would be limited to an evaluation performed by an employer's physician. One commenter (Ex. 22) suggested that DOE adopt OSHA's Lead Standard as a model for selecting physicians. DOE never intended to limit an employee's choice of physicians. To clarify this point, DOE has included in section 850.34, paragraphs (c) and (d), provisions for a multiple physician and alternate physician review. These provisions are explained in the discussion that follows.

DOE views medical surveillance as a primary tool for determining the extent of CBD risk within the worker population. Therefore, section 850.34(a)(4) requires responsible employers to maintain and give to the SOMD a list of beryllium-associated workers who may be eligible for medical surveillance. The list must be based on hazard assessments, exposure records, and any other information that will identify beryllium-associated workers (section 850.34(a)(4)(i)). In addition, section 850.34(a)(4)(ii) requires responsible employers to regularly update the list based on the information from the periodic evaluations performed pursuant to paragraph (b)(2) of this section.

One commenter (Ex. 16) questioned why DOE proposed to give the SOMD the task of identifying working conditions that contribute to the risk of CBD and determining the need for

additional exposure controls. This commenter believed that this task should be performed by an industrial hygienist. Similarly, another commenter (Ex. 23) stated that the SOMD should not be responsible for performing data analysis to determine which workers should be included in the medical surveillance program, or for maintaining the list of beryllium workers at a site. The commenter argued that both of these tasks are management functions that should be carried out by the responsible employer based on technical guidance provided by the industrial hygiene department and the SOMD. DOE agrees with both of these commenters. The responsible employer, not the SOMD, should have the function of identifying working conditions and evaluating the need for workplace controls. Consequently, DOE has revised the final rule to require that responsible employers identify beryllium-associated workers. However, medical judgments that are requisite to management decisions are the SOMD's responsibility.

Section 850.34(a)(5) requires the responsible employer to provide the SOMD with the information needed to operate and administer the medical surveillance program. This information includes, but is not limited to, the baseline beryllium inventory, hazard assessment results, and exposure monitoring data, as well as information regarding the identity and nature of activities or operations on the site that are covered under the CBDPP, the related duties of beryllium workers, and the types of personal protective equipment employed in the performance of these duties.

Section 850.34(a)(6) requires the responsible employer to provide the SOMD and the examining physician with (1) A copy of this rule and its preamble; (2) a description of the workers' duties as they pertain to beryllium exposure; (3) records of the workers' beryllium exposure; and (4) a description of personal protective and respiratory protective equipment in current or anticipated use. DOE believes that this information is necessary to ensure that the physician can make informed decisions regarding the required content of the medical evaluation and the subsequent development of recommendations related to each beryllium-associated worker.

Several commenters (Ex. 8, 17, 18, 19) suggested including provisions for providing beryllium education and training programs to physicians and other health care providers in the rule. DOE has not adopted this suggestion, because it would expand the scope of the rule.

Section 850.34(b) requires responsible employers to provide, without cost to beryllium-associated workers, all medical evaluations and procedures performed to comply with these regulations. This section also requires that all evaluations and procedures be performed at a time and place that are convenient for the worker. This provision is consistent with similar provisions in OSHA's expanded health standards. This section also requires responsible employers to provide the SOMD with a list of beryllium-associated workers who may be eligible for protective measures under the rule.

Section 850.34(b)(1) requires responsible employers to provide a baseline medical evaluation to beryllium-associated workers. The purpose of the baseline medical evaluation is to: (1) Establish the current health status of the worker and determine whether it is appropriate to assign the worker to jobs with beryllium exposure; (2) initially determine what level of medical surveillance the responsible employer must provide to the worker; and (3) establish essential baseline data for the worker which is used to assess subsequent health changes attributable to beryllium exposure.

DOE received a number of comments regarding baseline medical evaluations and medical testing. One commenter (Ex. 25) requested clarification as to the differences between pre-placement exams, as specified in DOE Notice 440.1, "Interim Chronic Beryllium Disease Prevention Program," and the baseline exams specified in the NOPR. The final rule will supersede DOE Notice 440.1, and the interim medical surveillance program requirements will be replaced with those of the final rule. The final rule does not refer to pre-placement exams. Another commenter (Ex. 23) recommended that the meaning of spirometry be clarified to ensure consistency. DOE agrees and has specified the measurement of forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV_1) in section 850.34(b)(1)(v) of the final rule.

A commenter (Ex. 19) questioned the value of baseline pulmonary function tests and x-rays. This commenter suggested that baseline studies cannot be used to determine which health changes are related to work hazards and which are related to other activities or disease processes. This commenter favored the approach of following patients clinically and using Be-LPT and other studies, to augment clinical impressions. Early identification of CBD, this commenter states, might have no positive effect on the course of the disease.

DOE disagrees with this comment. Early identification and intervention are important for identifying workers at higher risk of exposure to beryllium, and for preventing and minimizing the effects of beryllium-induced disease. DOE's position is supported by a commenter (Ex. 29) who stated that while spirometry and X-rays may not be predictive, X-rays have in some instances identified CBD cases in individuals who had a normal Be-LPT. This commenter stated that these cases are likely to be missed if spirometry and X-rays are not required, and also recommended X-ray screening for Be-LPT negative individuals with persistent chest problems. Another commenter (Ex. 19) emphasized the benefits of good data collection to determine if early removal of beryllium sensitized workers prevents the progression to CBD.

One commenter (Ex. 33) suggested that, if available, recent chest X-rays be utilized for the baseline medical evaluation to reduce X-ray exposure. DOE agrees that if previous chest X-rays have been conducted, for a baseline beryllium evaluation, additional X-rays should not be used unless specified by a physician. However, to ensure that the chest X-ray correlates with other diagnostic and historical information, only those X-rays taken for the purpose of a baseline beryllium evaluation or equivalent evaluation should be used to establish a baseline.

Section 850.34(b)(1)(vi) requires responsible employers to provide a Be-LPT as part of the baseline evaluation. The Be-LPT is the only available laboratory test for determining individual immune response to beryllium in vitro. Its use in a surveillance program will permit detection of beryllium-related health effects at a pre-clinical stage. A positive Be-LPT would indicate the need for further evaluation to determine the presence of CBD. The use of the Be-LPT as an evaluation tool provides an early opportunity for diagnosis and treatment of CBD.

Finally, section 850.34(b)(1)(vii) authorizes the examining physician to make available to the worker any additional tests deemed medically necessary. DOE believes that it is important that the examining physician have such discretion because individuals may exhibit different responses to beryllium. In this regard, one commenter (Ex. 16) expressed concern regarding proposed section 850.33(i), which provided that workers

would be referred for further diagnostic evaluation if there were two or more positive Be-LPTs. The commenter interpreted this provision as a mandatory requirement. DOE's intent is that workers have the opportunity for additional testing if recommended by the examining physician. A worker is not required by the rule to undergo additional medical evaluation and treatment.

One commenter (Ex. 29) recommended clinical referral for additional diagnostic tests after one positive Be-LPT, instead of two or more as proposed by DOE. DOE believes that the examining physician is in the best position to determine which additional tests, if any, would be useful in evaluating the health of an individual worker. Therefore, DOE has removed the requirement for follow-up testing based on two or more positive Be-LPT tests, relying instead on the examining physician's discretion under section 850.34(b)(1)(vii) to order follow-up tests when appropriate.

Section 850.34(b)(2) requires responsible employers to provide medical evaluations to beryllium workers annually, and to other beryllium-associated workers every 3 years. Responsible employers must provide the periodic medical evaluation elements described in section 850.34(b)(2)(i) to detect, at an early stage, any pathological changes that could lead to CBD or be aggravated by beryllium exposure. By detecting abnormalities early, workers may be medically removed to prevent further beryllium exposure.

Section 850.34(b)(2)(ii) requires responsible employers to provide to beryllium-associated workers a chest radiograph (X-ray) every 5 years. DOE includes this requirement for periodic X-rays because X-rays have been shown to be effective in the early detection of beryllium-related health effects (Ex. 29).

Following an emergency in which a worker, who is not already participating in the beryllium medical surveillance program, is exposed to an elevated amount of beryllium, the responsible employer is required by section 850.34(b)(3) to provide a medical evaluation as soon as possible.

A commenter (Ex. 23) suggested that a standard respiratory symptom questionnaire, medical work history form, and physical examination form be used at all DOE sites for consistency. DOE agrees that such standardized forms may help ensure consistency across the DOE complex, but is concerned that mandating the use of standardized forms may limit the discretion of the SOMD in determining the appropriate medical surveillance for each individual. Accordingly, DOE has decided to include appropriate standardized forms as non-mandatory guidance in an implementation guide to accompany the final rule. Another commenter (Ex. 29) was concerned that the NOPR required a respiratory symptom questionnaire for periodic medical evaluations, but not for the baseline evaluation. DOE acknowledges this oversight and has included the respiratory symptom questionnaire as part of both the periodic and baseline medical evaluations in sections 850.34(b)(1)(ii) and (b)(2)(I)(B) of the final rule.

Section 850.34(c) requires responsible employers to establish a multiple physician review process for affected beryllium-associated workers. DOE has identified three benefits of providing a multiple physician review process: (1) to strengthen and broaden the bases for medical decisions made pursuant to this rule when a beryllium-associated worker questions the findings, recommendations, or determinations of an initial physician retained by the responsible employer; (2) to increase beryllium-associated workers' confidence in the soundness of medical findings, recommendations and determinations made under this rule; and (3) to increase beryllium-associated worker's acceptance of, and participation, in the medical surveillance program.

Given the shortage of trained and experienced occupational physicians, it is possible that some physicians performing examinations or consultations under the beryllium rule will misdiagnose CBD. However, rather than requiring multiple medical opinions in all cases, which would be expensive and potentially wasteful, DOE is providing to beryllium-associated workers an opportunity to obtain an independent review of the findings, determinations or recommendations of the physician selected by the responsible employer. Over time, this independent review is likely to show either that a perceived low level of confidence in the physician retained by the responsible employer is unwarranted, or that the responsible employer should improve the quality of the medical surveillance being provided. In either case, the multiple physician review process will have served a beneficial purpose.

In section 850.34(c)(1), a beryllium-associated worker may designate a second physician to review any findings, determinations, or recommendations of the physician chosen by the responsible employer, and to conduct such examinations, consultations, and laboratory tests as the second physician may deem necessary to facilitate this review. The responsible employer's obligation to provide information to the examining physician extends to other physicians involved in the multiple physician review or alternate physician review process so that all of the physicians involved will have an equal opportunity to assess the beryllium-associated worker's health status.

Section 850.34(c)(2) requires that after an initial physician conducts an examination or consultation, the responsible employer must promptly notify the worker of his or her right to seek a second medical opinion. This notification must be in writing.

Section 850.34(c)(3) requires that after the worker is notified of this right, the responsible employer may condition its participation in, and payment for, multiple physician review upon the worker, within 15 days after receipt of the notification or the initial physician's written opinion, whichever is later, both (1) informing the responsible employer that the worker intends to seek a second medical opinion, and (2) initiating steps to make an appointment with a second physician.

The rule contains no limitation on a beryllium-associated worker's choice of a second physician, except the requirement in section 850.34(a)(3) that the second physician must be a licensed physician who is familiar with the health effects of beryllium.

If the second physician's findings, determinations, and recommendations are the same as those of the initial physician, then the multiple physician review process comes to an end. However, as provided in section 850.34(c)(4), if the opinions of the two physicians are in conflict, then the responsible employer and the beryllium-associated worker must undertake to encourage the two physicians to resolve any disagreement. DOE expects that the two physicians will communicate with each other to resolve their differences, but the rule requires the responsible employer and worker to encourage such a resolution. In most cases, this professional interaction should resolve any differences of opinion.

In cases where differences remain, these differences of opinion are likely to be genuine and substantial. If the first two physicians are unable to resolve expeditiously any differences of opinion with respect to a beryllium-associated worker, then it is necessary for a third qualified physician to resolve the dispute. It is critical that this third

physician has the confidence of those concerned and is competent to resolve the dispute. Consequently, section 850.34(c)(5) requires that the responsible employer and the beryllium-associated worker together, through their respective physicians, must designate the third physician.

Under section 850.34(c)(5) the third physician will have a full opportunity to review the findings, determinations, and recommendations of the two prior physicians, and to conduct such examinations, consultations and laboratory tests as the third physician deems necessary. DOE's expects that the third physician will consult with the other two physicians. The third physician should provide a written medical opinion to the SOMD which will be used to resolve the disagreement between the other two physicians. Section 850.34(c)(6) requires the SOMD to act in a manner consistent with the findings, determinations, and recommendations of the third physician, unless the SOMD and the beryllium-associated worker reach an agreement that is otherwise consistent with the recommendations of at least one of the other two physicians.

Since the multiple physician review process will be a means by which medical surveillance is provided to a beryllium-associated worker, responsible employers must bear the expense of this process when it is used. Based on OSHA's practice and experience with multiple physician review in its health standards, DOE does not expect the costs of this process to be burdensome to the responsible employers. If responsible employers establish and administer medical surveillance programs that engender worker confidence, workers should have little or no need to seek second medical opinions.

The requirement for multiple physician review is not intended to preclude responsible employers from establishing and implementing alternate medical protocols. DOE has included language in section 850.34(d) to provide for alternate physician determination. Under that section, the responsible employer and beryllium-associated worker, or the worker's designated representative, may agree upon the use of any expeditious alternate physician determination process, instead of the multiple physician review process. The only condition is that the alternate process be no less protective of the worker's health than the multiple review process. For example, a jointly agreed upon physician might be used in the first instance without recourse to other physicians. DOE encourages responsible employers and workers to adopt medical determination procedures in which all parties have trust and confidence.

Section 850.34(e)(1) requires the SOMD to provide to responsible employers, within two weeks after receipt of results, a written and signed medical opinion after each medical evaluation of a beryllium-associated worker. The purpose of requiring the SOMD to give the responsible employer a written opinion is to inform the responsible employer of the medical basis for determining the job placement of the examined worker. This written medical opinion, as described in section 850.34(e)(i–iii), must contain any diagnosis of the worker's condition related to occupational exposure to beryllium; any other detected medical conditions relevant to further beryllium exposure; any recommended restrictions on the worker's exposure to beryllium or on the use of protective clothing or equipment; and a statement indicating that the SOMD or the examining physician has provided to the worker the results of the test, the medical evaluation, including all tests results and any medical condition related to beryllium exposure that requires further evaluation or treatment.

Section 850.34(e)(2) requires the SOMD to withhold from the responsible employer, orally or in the written medical opinion, specific findings or diagnoses not related to occupational exposure to beryllium.

Two commenters (Ex. 23, 28) expressed concern regarding proposed section 850.33(j)(2), which stipulated that the physician's written medical reports be delivered within 15 calendar days after the completion of a medical evaluation. The commenters noted that Be-LPT tests are time-consuming and may exceed the 15-day time frame, and suggested that the 15-day period should begin after receipt of the test results. DOE agrees, and has revised section 850.34(f) to require the SOMD to give beryllium-associated workers a written medical opinion containing the results of all medical tests or procedures, an explanation of any abnormal findings, and any recommendation that the worker be referred for additional testing within 10 working days after the SOMD's receipt of test results.

In section 850.34(f)(2), upon request by the beryllium-associated worker, the responsible employer is required to provide the worker with a copy of the information the responsible employer is required to provide to the examining physician.

Section 850.34(g) requires the responsible employer to report on the applicable OSHA reporting form (currently OSHA Form No. 200) beryllium sensitization, CBD, or any other abnormal condition or disorder of workers caused or aggravated by occupational exposure to beryllium. Although not included in the proposed rule, this provision reflects current practices and does not impose a new burden on employers. Reporting abnormal conditions and disorders that are occupationally caused and beryllium-related will contribute to the development of occupational health statistics that eventually may lead to improved disease prevention and medical intervention for beryllium-associated workers. It will also provide DOE with information and data helpful in assessing the effectiveness of the CBDPP rule and in considering what, if any, modification should be made to the rule in the future.

Section 850.34(h)(1) requires responsible employers to establish a routine and systematic analysis of medical, job, and exposure data. The purpose of this requirement is to collect and analyze information so that the prevalence of disease can be accurately described and conclusions reached on causes or risk factors for the disease. This data analysis is an effective means of measuring performance under the CBDPP, and for correcting and improving the CBDPP. Section 850.34(h)(2) requires the responsible employer to use the results of these analyses to determine which workers should be offered medical surveillance and the need for additional exposure controls.

Section 850.35—Medical Removal

Section 850.35 (proposed as section 850.34) requires responsible employers to establish medical removal protection (MRP) and medical removal protection benefits (MRPB) as part of the CBDPP.

Medical surveillance can only be effective in detecting and preventing disease if beryllium-associated workers: (1) voluntarily seek medical attention when they feel ill; (2) refrain from efforts to conceal their true health status; and (3) fully cooperate with examining physicians to facilitate accurate medical diagnoses and effective treatment. This sort of worker participation and cooperation cannot be evoked by coercion; it will occur only where no major disincentives to meaningful worker participation exist. Without such participation, it would be much more difficult, if not impossible, to adequately monitor workers' health and to identify workers who need temporary or permanent medical removal.

MRP is a logical result of medical surveillance. Without MRP, responsible employers would be free to maintain high-risk workers in their current jobs, which would not be sufficiently protective of their health. Alternatively, responsible employers could choose to terminate workers or transfer them from higher-paying, beryllium-exposed jobs to lower-paying, non-beryllium jobs. This might be protective, but it would impair the workers' standards of living. In either case, the effectiveness and integrity of the medical surveillance program would be compromised.

With MRP, beryllium-associated workers are assured of being removed to jobs where exposure to beryllium is low if such removal is determined to be necessary to protect their health. With MRPB, workers are assured that, if they fully participate in medical surveillance and if the results of medical surveillance require removal from their beryllium exposed jobs, their normal earnings and job status will be protected for a pre-determined period.

Thirty-two commenters (Ex. 12 is a form letter submitted by 16 beryllium workers) commented on the proposed MRP and MRPB provisions in the NOPR. They addressed a wide variety of issues and frequently expressed opposing viewpoints. For instance, two commenters (Exs. 16, 26) stated that the proposed MRP provisions went too far (e.g., two years of protection is too long; accepted applicants should not be included under the provisions), while others (Exs. 3, 8, 12, 14, 17, 18, 22, 24, 28, 29, 31) stated that the provisions did not go far enough (e.g., two years of protection is not long enough; one follow-up examination is not enough; the training costs limits are too restrictive; the rule should provide provisions for multiple physician reviews). Several commenters (Exs. 20, 22, 31) argued against the voluntary nature of the proposed provisions, stating that it would be unethical to allow a worker with CBD to continue to be exposed to beryllium, and suggesting that workers could be wrongfully pressured into staying in beryllium-related jobs. Other commenters (Exs. 29, 30) agreed with DOE's proposal to require employee consent, and requested that DOE provide additional guidance to help workers make more informed decisions regarding their medical removal. DOE has decided, consistent with some of the comments, to use the provisions of OSHA's expanded health standards as the basis for the MRP and MRPB provisions of the final rule. DOE has modeled the MRP and MRPB provisions of this final rule upon similar provisions in OSHA's Cadmium, Lead and Benzene standards, 29 CFR 1910.27, 1910.1025 and 1910.1028, respectively. DOE's rationale for each provision of section 850.35 in the final rule is discussed below.

Section 850.35(a) requires responsible employers to offer a beryllium-associated worker medical removal from exposure to beryllium on each occasion that the SOMD determines in a written medical opinion that medical removal is required. The SOMD's determination must be based upon one or more positive Be-LPT results, CBD diagnosis, an examining physician's recommendation, or any other signs or symptoms the SOMD deems medically sufficient to show that the worker has a medical condition that places the worker at increased risk of material impairment to health from further exposure to beryllium.

Section 850.35(a)(1) deals with temporary removal. It requires the responsible employer to offer temporary medical removal to a beryllium-associated worker whenever the SOMD determines in a written medical opinion that the worker should be removed pending a final medical determination on the worker's health. The responsible employer must offer to temporarily remove a worker regardless of whether a job is available into which the removed worker may be transferred. If no such job is available, the responsible employer must pay medical removal protection benefits to the worker for up to one year. Section 850.35(a)(1) (iii) and (iv) require that for each time a beryllium-associated worker is temporarily removed, the responsible employer must maintain the worker's total normal earnings, seniority and other employment rights as if the worker were not removed, either by providing an appropriate alternative job or by paying MRPB, for one year.

If a final medical determination is made that the worker does not have a medical condition which places the worker at increased risk of material impairment to health from exposure to beryllium, the temporary MRP must be lifted so that the affected worker may return to his or her normal duties.

Section 850.35(a)(2) requires the responsible employer to offer beryllium-associated workers permanent medical removal whenever the SOMD determines in a written medical opinion that the beryllium-associated worker should be permanently removed from exposure to beryllium. Once a worker is permanently removed, the worker will receive the medical removal protection benefits specified in section 850.35(b) of this rule.

Section 850.35(a)(3) is intended to ensure that beryllium-associated workers are given the information needed to make an informed decision on whether to accept temporary or permanent removal from a job with a potential for beryllium exposure.

Section 850.35(a)(4)(i) prohibits the responsible employer from returning a beryllium-associated worker who has been permanently removed to the worker's former job status, unless the SOMD has determined in a written medical opinion that removal is no longer necessary to protect the worker's health, or the exception in section 850.35(a)(4)(ii) applies. Under section 850.35(a)(4)(ii), if there are special circumstances that make medical removal an inappropriate remedy, or if the SOMD's professional opinion is that continued exposure will not pose an increased risk to the worker's health (e.g., the potential decrements to the worker's lung function are not projected to be any greater if the worker were permitted to continue on the job than they would be if the worker were removed), the SOMD must fully discuss the matter with the worker and, in a written medical determination, may recommend returning the worker to his or her former job status. The purpose of this exception is to provide some flexibility where it is reasonably clear that returning the worker to his or her normal job is unlikely to adversely affect the worker's health. For example, a return to work may be justified if a worker who is not experiencing a decrease in lung function, has been on medical removal for 2 years and is about to retire, and the time that the worker will continue to be occupationally exposed at or above the action level is very limited. If the SOMD recommends return of the worker in such cases, the SOMD may require the responsible employer to provide the worker with additional protection, such as a supplied air respirator operated in a positive pressure mode. In any event, a decision to return the worker should be made only after the SOMD has fully explained the relevant facts and prognoses to the worker.

Section 850.35(b) establishes the MRPB that must be provided to removed workers. DOE believes that the establishment of MRPB is critical to minimize the disability associated with CBD. Removal from exposure and effective job-placement efforts, coupled with early diagnosis and treatment, will increase the likelihood that affected beryllium-associated workers will continue as productive members of the DOE workforce. In addition, MRPB will encourage worker participation in the

medical surveillance program by providing beryllium-associated workers with a reasonable level of assurance that a finding of sensitization or diagnosis of CBD will not lead to the loss of their employment.

Under section 850.35(b)(1), the responsible employer is required to provide up to two years of MRPB to a beryllium-associated worker on each occasion that he or she is medically removed from exposure to beryllium in accordance with this part.

Section 850.35(b)(2) requires the responsible employer to provide the "total normal earnings, seniority, and all other workers rights and benefits" of a removed beryllium-associated worker as if the worker had not been removed. The purpose of this requirement is to ensure that a removed worker does not suffer economic loss due to the removal. Thus, if a removed worker routinely earned overtime pay on the job from which he or she was removed and would have continued to do so during the removal period, then MRPB must include the amount of expected overtime as part of the worker's "total normal earnings." DOE selected 2 years as the maximum period during which the responsible employer is required to pay MRBP to a worker who accepts removal instead of the 18 month protection period established in OSHA's Lead and Cadmium standards. DOE has established a different protection period for beryllium because of the toxicological differences between beryllium and the two metals covered in the OSHA standards. Specifically, the early stages of the health impairments associated with exposure to lead or cadmium will reverse in time with no additional exposure, but beryllium sensitization and CBD will not. The objective of OSHA's 18 month period is to provide workers with sufficient recovery time so that they can return to their job. The objective of DOE's 24 month period, however, is to allow beryllium-associated workers who accept permanent medical removal sufficient time to be retrained and placed in different job. DOE believes that this period should be long enough to enable the majority of removed beryllium-associated workers to be retrained and placed in another job or, for those workers who can be returned to their former job status, to be returned before their MRPB expire.

Under section 850.35(b)(3), if a removed worker files a claim for workers' compensation payments for a beryllium-related disability, the responsible employer must provide MRPB pending disposition of the claim. The responsible employer receives no credit for the workers' compensation payments received by the worker for treatment related expenses.

In section 850.35(b)(4), the responsible employer's obligation to provide MRPB is reduced by the amount of any compensation the beryllium-associated worker receives from any other source for earnings lost during the period of removal. This provision is necessary to ensure that MRPB does not result in a "windfall" to the worker who collects other compensation, including salary from another job, while the worker is on medical removal from exposure to beryllium.

Section 850.35(b)(5) provides that the requirement that a responsible employer provide MRPB is not intended to expand upon or restrict any rights a worker has or would have had, absent medical removal, to a specific job classification or position under the terms of a collective bargaining agreement.

Section 850.35(b)(6) provides that a responsible employer may condition the provision of MRPB upon the beryllium-associated worker's participation in medical surveillance. Thus, although the rule does not require worker participation in medical surveillance, it permits the responsible employer to deny economic protection to workers who are unwilling to participate in medical surveillance. Since the responsible employer must bear the financial burden of medical removal, the employer has a legitimate interest in minimizing the need for medical removal. Unless workers participate in medical surveillance, the responsible employer may not be able to identify workers whose exposure to beryllium should be reduced to avoid the need for medical removal.

In providing the responsible employer the authority to condition provision of MPRB upon a beryllium-associated worker's participation in medical surveillance, DOE does not intend to permit an employer to deny MRPB for insignificant lapses in such participation. The worker's actions should be assessed reasonably, in light of the goal of prevention of disease and the employer's interest in minimizing the need for medical removal.

Section 850.36—Medical Consent

Section 850.36 (proposed as section 850.35) establishes the medical consent provisions of the CBDPP. Because worker participation in the medical surveillance program established by this rule is voluntary, this section is necessary to ensure that beryllium-associated workers receive adequate information to make an informed decision regarding their participation in the program.

Section 850.36(a) requires responsible employers to provide beryllium-associated workers with a summary of the medical surveillance program, the type and purpose of data to be collected, how the data will be maintained, and protections for ensuring the confidentiality of medical records. Responsible employers must provide this information at least one week before any medical evaluation or tests, or when requested by the worker.

Section 850.36(b) requires responsible employers to provide beryllium-associated workers with information on the benefits and risks of the medical tests and examinations offered as part of medical surveillance. This information must be provided at least one week prior to any examination or test. DOE expects responsible employers to make reasonable efforts to help workers understand the material. Accordingly, section 850.36(b) requires responsible employers to give beryllium-associated workers an opportunity to ask questions and receive answers before a medical evaluation is performed.

Section 850.36(c) requires responsible employers to have the SOMD obtain the beryllium-associated worker's signature on the informed consent form found in Appendix A to this part, before medical evaluations or tests are performed.

Section 850.37—Training and Counseling

Section 850.37 (proposed as section 850.36) establishes requirements for training and counseling workers regarding exposure to beryllium, and the potential health effects associated with such exposure. This worker training is necessary because the appropriate implementation of the required workplace procedures of the CBDPP ultimately rests upon the front-line workers who will be performing work on, with, or near beryllium or beryllium-contaminated materials. These workers cannot be expected to implement the required CBDPP procedures if they are not aware or fully appreciative of the significance of these procedures.

DOE expects that responsible employers will conduct training in a manner that is easy to understand. Training material should be appropriate in content and vocabulary to the education level, and language background of affected workers. The goal of training is to ensure that all workers, regardless of cultural or educational background, have the knowledge necessary to reduce and minimize their exposure to beryllium.

Section 850.37(a)(1) requires responsible employers to develop and implement a worker training program for beryllium-associated workers and all other individuals who work at a site where beryllium activities are conducted, and ensure their participation in the program. DOE recognizes that OSHA's Hazard Communication standard (29 CFR 1910.1200) already requires that employers provide their workers with training regarding the risks associated with all hazardous materials in the workplace. DOE does not intend that employers would implement separate and redundant training and information programs to comply with both this rule and the Hazard Communication standard. Accordingly, sections 850.37(b)(1) and (2) require responsible employers' CBDPP training and information programs to comply with the Hazard Communication standard as well as address the contents of the CBDPP. Through this provision, DOE intends for responsible employers to integrate their CBDPP training and information efforts into their existing Hazard Communication training program. This will minimize the burden on responsible employers and provide for a consistent approach to worker training and the communication of workplace hazards.

DOE added "contents of the CBDPP" to the training requirements in section 850.37(b) because this information is essential for a worker to understand how to effectively participate in the CBDPP. OSHA's Hazard Communication standard (29 CFR 1910.1200) does not explicitly refer to anything like a CBDPP. In the final rule, DOE has removed specific mention of several subjects (beryllium health risk, exposure reduction, and safe handling of beryllium and medical surveillance) that were specifically identified in the proposed rule. These subjects are adequately covered in the Hazard Communication standard.

One commenter (Ex. 3) recommended detailed training for workers who have had, or are likely to have, exposures to beryllium because their assigned tasks may have involved beryllium. DOE generally agrees with the commenter and in the final rule has used a performance-based approach to identifying the workers to be trained. Section 850.37(b), paragraphs (1) and (2), require detailed training for beryllium-associated workers.

In the NOPR (Section V, Request for Information), DOE stated that it was considering including a requirement that responsible employers develop and implement an outreach education program for family members of beryllium workers. Commenters generally agreed on the need to inform workers' families about beryllium hazards, but had different views about how it should be accomplished. Two commenters (Exs. 16, 26) recommended that an outreach requirement not be included in the rule and, instead, that workers be relied upon to relay beryllium information to their families. Several other commenters (Exs. 17, 28, 30, 31) recommended that DOE include an outreach requirement in the rule, and require employers to provide beryllium information without relying on the workers. After considering all of the comments, DOE has added section 850.37(b)(3), which requires the responsible employer to provide to its workers information about risks to family members. This section relies upon the workers to relay the relevant beryllium hazard information to their families. DOE encourages responsible employers to provide beryllium-associated workers with information about beryllium risks that is readily understandable to family members and others, as well as to the workers.

One commenter (Ex. 4) recommended that the requirement for outreach not be included as part of the rule, but that DOE provide outreach information from a central point in DOE. The commenter felt that this approach would be more efficient than having each responsible employer develop and provide its own outreach information. DOE disagrees with this comment, and is of the view that more effective outreach will be provided if responsible employers include information about beryllium risks to families and others as part of the detailed training provided to beryllium-associated workers and those who use protective clothing and equipment.

One commenter (Ex. 3) recommended general awareness training for workers who are not beryllium-associated workers but who, at some time, may be at risk because they work at a site where beryllium activities are conducted. DOE agrees with this recommendation, and section 850.37(c) requires the responsible employer to provide general awareness training about beryllium hazards and controls to these workers.

Section 850.37(d) requires that the responsible employer provide training to workers prior to initial assignment and at least every two years thereafter to ensure that workers are appropriately prepared to deal with the hazards and risks of working with beryllium. The initial training requirement of this paragraph is important to ensure that workers have the information they need to protect themselves before they are actually subject to exposure or potential exposure hazards. Periodic training is necessary to reinforce and update initial training, especially with regard to the protective actions workers must take at their current jobs to reduce their potential for exposure to beryllium. DOE has established the frequency of two years as a minimum requirement, rather than the proposed one year.

Section 850.37(e) requires the responsible employer to provide additional training when the employer has reason to believe that a beryllium worker lacks the proficiency, knowledge, or understanding needed to work safely with beryllium. This situation could occur because of changes in workplace operations, controls, or procedures or the availability of new or updated information regarding the health risk associated with exposures to beryllium. Also, a worker's performance may show that the worker has not retained the requisite proficiency. DOE used the retraining requirements of the OSHA scaffold standard (29 CFR 1926.454(c)) as a model for section 850.37(e).

Section 850.37(f) requires the responsible employer to develop and implement a worker counseling program to assist beryllium-sensitized workers and workers diagnosed with CBD. The purpose of the counseling program is to communicate to workers information that may help them make important health-and work-related decisions and perform administrative activities, such as filing workers' compensation claims. This section also requires the responsible employer to communicate information concerning the following topics: the medical surveillance program; medical treatment options; medical, psychological, and career counseling; medical benefits; administrative procedures and worker rights under applicable workers' compensation laws and regulations; work practices aimed at limiting worker exposure to beryllium; and the risk of continued exposure after sensitization.

One commenter (Ex. 23) cautioned that the proposed language dealing with workers' compensation counseling could have been interpreted as imposing obligations that exceed employer obligations under states' workers' compensation statutes. DOE has included in section 850.37(f) the qualifying language "administrative procedures and worker rights" and "under applicable workers' compensation laws and regulations" to make clear that DOE does not intend to establish any new workers' compensation obligations. DOE understands that responsible employers

may develop such counseling programs in consultation with labor organizations representing covered workers, and that employers may wish to advise the workers to consult their own attorneys on these matters.

Another commenter (Ex. 22) recommended that beryllium training be provided by organizations or persons who receive grants from DOE. This commenter asserted that it is inappropriate for DOE contractors, who are responsible employers, to conduct beryllium training because these employers are not sufficiently independent. DOE does not agree with this comment and has not adopted this recommendation. The vast majority of DOE's safety and health training is currently being conducted adequately by responsible employers, and it is common outside of DOE for employers to provide safety and health training to their employees.

One commenter (Ex. 21) recommended that this section be revised to include the adult education principles outlined in Appendix E of OSHA's Hazard Communication standard (29 CFR 1910.1200) because these principles have been effective when applied to training workers. While DOE has not explicitly referenced this advisory Appendix in the final rule, nothing in the rule prohibits its use. Although the Appendix appears to be a good example of the use of adult educational principles that an employer could use to train workers on their hazard communication program, it does not expressly identify or describe these principles. Responsible employers would have to infer the principles from Appendix E and then apply those principles to their beryllium training program. In addition, DOE believes that an explicit reference to this Appendix in the rule would be confusing because this Appendix is not specifically applicable to beryllium training.

Section 850.38—Warning Signs and Labels

Section 850.38 (proposed as section 850.37) requires responsible employers to post warning signs and labels to ensure that the presence and dangers associated with beryllium and beryllium-contaminated materials or areas are communicated to workers. Section 850.38(a) requires the posting of warning signs at all entranceways to established regulated areas and that these signs bear the following warning:

DANGER
BERYLLIUM CAN CAUSE LUNG DAMAGE
CANCER HAZARD
AUTHORIZED PERSONNEL ONLY

The purpose of these signs is to minimize the number of persons in a regulated area by warning workers prior to entry. The signs alert workers to the fact that they must have the appropriate authorization from their supervisor to enter the regulated area. This is especially important when regulated areas are established on a temporary basis, such as during cleanup operations. In such cases, workers who typically work in or travel through the area may not be aware of the new potential for exposures to beryllium and, thus, may not be appropriately equipped for or aware of the need to protect themselves from potential exposures. Warning signs also serve as a constant reminder to those who work in regulated areas that the potential for exposure to beryllium exists in the area and that appropriate controls must be used.

Sections 850.38(b)(1) requires responsible employers to label with appropriate hazard warnings all containers of beryllium, beryllium compounds, or beryllium-contaminated clothing, equipment, waste, scrap, or debris to ensure that individuals who come in contact with the containers are aware of their contents and the need to implement special handling precautions. Because the effectiveness of the warning labels in achieving these objectives is greatly dependent upon the visibility, accuracy, and understandability of the content of the labels, section 850.38(b)(2) further specifies that labels bear the following information:

DANGER
CONTAMINATED WITH BERYLLIUM
DO NOT REMOVE DUST BY BLOWING OR SHAKING
CANCER AND LUNG DISEASE HAZARD

Section 850.38(c) clarifies that the warning signs and labels developed to comply with the CBDPP must also comply with the OSHA Hazard Communication standard, 29 CFR 1910.1200. DOE believes this clarification is needed to avoid duplication of effort. In addition, DOE believes that ensuring that the content and format of warning signs and labels comply with the Hazard Communication standard will result in a consistent, recognizable, and comprehensive approach to alerting workers to beryllium's potential to cause disease.

One commenter (Ex. 20) asked if DOE had given consideration to requiring that warning signs and labels be provided in languages other than English or the use of universal symbols to communicate information. DOE notes that 29 CFR 1910.1200(f)(9) (OSHA's Hazard Communication standard) states that employers with employees who speak other languages may present the information in those other languages, as long as the information is presented in English as well. DOE agrees with this approach. Thus, section 850.38(c) requires that all warning signs and labels comply with 29 CFR 1910.1200.

Another commenter (Ex. 23) noted that the warning signs provisions specified in the NOPR differed slightly from those in DOE Notice 440.1, and suggested that DOE retain the NOPR language in the final rule in lieu of the language in the Interim CBDPP. DOE notes that the warning signs and labels provisions of the NOPR were based on the provisions of the Interim CBDPP, with minor modifications added to clarify the intent of the requirements. DOE has retained these clarifications in section 850.38 of the final rule.

A third commenter (Ex. 9) was concerned that references to cancer and cancer hazards in warning signs and labels may be misleading and deceptive, and, noting that the reference did not represent the opinion of a qualified medical professional, recommended that DOE obtain a "qualified medical opinion" to resolve this issue. DOE believes that the action of the International Agency for Research on Cancer (IARC) and ACGIH in classifying beryllium as a human carcinogen provides sufficient basis for retaining the cancer warning on warning signs and labels for beryllium-contaminated materials. DOE further notes that NIOSH has classified beryllium as a potential occupational carcinogen since 1977.

Section 850.39—Recordkeeping and Use of Information

Section 850.39 (proposed as section 850.38) requires responsible employers to establish and effectively manage records that relate to the CBDPP and to periodically submit to the Office of Environment, Safety and Health a registry of beryllium-associated workers.

Section 850.39(a) requires the responsible employer to establish and maintain up-to-date and accurate records of all beryllium inventory information, hazard assessments, exposure measurements, exposure controls, and medical surveillance data. DOE believes that up-to-date and accurate records are essential for effectively implementing the CBDPP, assessing its adequacy, and studying the relationship between workplace conditions and CBD. Some of these records will be needed to implement the

performance feedback provisions in section 850.40.

One commenter (Ex. 31) recommended that the final rule explicitly reference OSHA's regulations at 29 CFR 1910.1200 and CFR 1910.1020. OSHA regulations at 29 CFR 1910.1200 (Hazard Communication) already require employers to keep records of beryllium inventory information, and regulations at 29 CFR 1910.20 (Access to Employee Exposure and Medical Records) already require employers to keep records of beryllium hazard assessments, exposure measurements, and medical surveillance data. DOE has not, however, included in section 850.39 references to these OSHA standards. DOE believes that this rule's requirements for maintaining and transferring CBDPP-related records, while ensuring confidentiality of personal information, are stated in clear and concise wording specifically related to the CBDPP that is preferable to cross-referenced OSHA standards. Furthermore, one commenter's (Ex. 31) primary concern was ensuring that workers have access to the information that relates to their personal exposure and medical status. DOE has addressed this concern in section 850.24(g), by requiring responsible employers to notify affected workers of beryllium monitoring results, and in section 850.34(d)(2), by requiring the SOMD to provide to workers the results of medical tests and procedures.

DOE encourages responsible employers to take advantage of existing recordkeeping systems to minimize the burden of implementing section 850.39. Responsible employers also may find that records that are generated outside the CBDPP may be useful in implementing the CBDPP. Examples are records of beryllium training, personnel demographics, beryllium mission descriptions, and payroll records of projects that can be used to link workers with potential beryllium exposure.

Section 850.39(b) requires Heads of DOE Departmental Elements to designate all record series required to be generated under this rule as federal records and, therefore, subject to all applicable federal records management and access laws.

One commenter (Ex. 18), in commenting on the baseline inventory provisions of the proposed rule, recommended that DOE require full public disclosure of health and safety documents related to past beryllium emissions and exposures. In the final rule, DOE is requiring Heads of DOE Departmental Elements to designate the CBDPP-required records as federal records. Federal records, except for records containing specific types of sensitive information, are available to the public under the Freedom of Information Act (FOIA) and related federal policy. The FOIA requires the federal government to release government records upon request, except for information that is exempted from disclosure to protect an overriding interest, such as privacy, national security, and trade secrets and other confidential business information. The FOIA exemption for information in personnel and medical files (5 U.S.C. 552(b)(6)) is especially important for DOE CBDPP-required records, because many of these records contain medical information that is protected from release by this FOIA provision and other federal laws.

One commenter (Ex. 21) recommended that DOE address the retention of records in this rule. DOE has added to section 850.39(b) the requirement that Heads of DOE Departmental Elements ensure that the record series generated as required under this rule are retained for at least 75 years, which is consistent with DOE's policy on retaining medical records. This requirement will ensure that required CBDPP records that relate to workplace conditions will be available in the future to correlate with the beryllium-associated workers' medical records. Heads of DOE Departmental elements will be able to ensure that they can comply with section 850.39(b) if the CBDPP-required records generated by DOE responsible employer contractors are identified in the relevant contracts as DOE-owned documents. Therefore, DOE expects that Heads of DOE Departmental elements will direct their DOE contract officers to stipulate DOE ownership of these documents in those contracts.

The same commenter recommended that DOE address the transfer of records to successive responsible employers. DOE agrees that this information should be covered in the rule, and has added section 850.39(c) to require responsible employers to convey to DOE, or its designee, all record series generated under this rule if the responsible employer ceases to be involved in the CBDPP (e.g., ceases to be a DOE contractor).

Section 850.39(d) requires that responsible employers create links between data sets on workplace conditions and health outcomes to serve as a basis for understanding the beryllium health risk. This linkage of data will assist DOE and responsible employers in identifying unsafe work practices and understanding the relationship between workplace conditions and CBD.

Section 850.39(e) requires the responsible employer to ensure the confidentiality of all records containing personal, private information that are generated as required by this rule. Protecting the confidentiality of these records is required by the Americans with Disabilities Act (42 U.S.C. 12112(d)(4)), the Privacy Act (5 U.S.C. 552a) and other applicable laws. In addition, DOE recognizes that many beryllium-associated workers will participate in some of the voluntary components of the CBDPP only if they believe that their personal information will be kept confidential.

Section 850.39(e)(1) explicitly requires responsible employers to ensure that all records that are transmitted to other parties do not contain names, social security numbers or any other variables, or combination of variables, that could be used to identify individuals. DOE recognizes that responsible employers must take these precautions to prevent the violation of confidentiality laws because personal information could be obtained from transmitted records, or inferred from information other than personal identifiers in the records, unless these precautions are taken.

One commenter (Ex. 4) stated that the rule's confidentiality requirements could prevent industrial hygienists from obtaining the health outcome information that is necessary to perform the linkage of site workplace conditions and health outcomes required by section 850.39(d). DOE does not intend health outcome information that would compromise confidentiality to be provided to industrial hygienists. DOE believes that the linkage required by section 850.39(d) could be performed after personal identifiers are removed from the health outcome information, making it consistent with section 850.39(e)(1).

Another commenter (Ex. 16) recommended that the final rule require the responsible employer to place beryllium medical records in the custody of a medical director, as opposed to the proposed requirement that medical records be held by the responsible employer. DOE recognizes that beryllium medical records may be in the custody of physicians involved in CBD studies other than the SOMD. DOE responds to this commenter's (Ex. 16) concern in section 850.39(e)(2)(i) by requiring responsible employers to ensure that individual medical information generated by the CBDPP is either included as part of the worker's site medical records and maintained by

the SOMD, or is maintained by another physician designated by the responsible employer.

Section 850.39(e)(2)(ii) (proposed section 850.38(d)) retains the proposed requirement that responsible employers ensure that individual medical information generated by the CBDPP is maintained separately from other records. A commenter (Ex. 19) recommended that the rule require responsible employers to use only one data system, maintained by the SOMD, to facilitate the analysis of the data and to increase workers' confidence in the confidentiality of SOMD-maintained records. DOE retained this requirement, however, because the separation of medical and other records is good file management. Further, the Americans with Disabilities Act (42 U.S.C. 12112(d)(4)(C)) requires such separation for privately-owned medical information. DOE recognizes that analysis of the data may be somewhat more difficult with separately maintained medical records, but separation of these records is required by law. There also are practical reasons to require the separation of these records. Personnel officials would require authorization from medical directors before accessing personnel records that were stored with medical records. At the same time, the medical directors would need a system to ensure that no confidential medical information was mixed in with the personnel records that personnel officials accessed. Employers eliminate these administrative burdens by maintaining separate medical and personnel records.

Section 850.39(f) requires the responsible employer to maintain all records required by this part in current and accessible electronic form to permit ready retrieval of data in a format that maintains confidentiality. This requirement is necessary to facilitate timely, efficient, and cost-effective transfer and analysis of CBDPP-related data. DOE has added the phrase "in current and accessible" to this section because DOE's experience indicates that the ability to use information held in electronic records is severely hampered if the electronic systems are out-of-date or the records are difficult to obtain. Similarly, DOE has added the phrase "that maintains confidentiality" to this section because DOE's experience indicates that transferring information while maintaining confidentiality cannot practically be accomplished using systems that must be modified, converted, or replaced before the transfer can occur.

A commenter (Ex. 21) recommended that the final rule require responsible employer contractors to use the same record retrieval identifiers that any predecessor contractor used. This would allow current contractors easily to link their data to the predecessor contractors' data on the same subject. DOE agrees that successive contractor's use of the same record retrieval identifiers would make exposure-health outcome and epidemiology studies easier to conduct. Therefore, DOE encourages successor contractors to use the same record retrieval identifiers as the predecessor contractor. DOE has not, however, made this a requirement in the final rule because it would be inconsistent with DOE's commitment to a performance-based rule to mandate this practice. DOE's goal in developing this rule is to allow the responsible employer maximum flexibility by specifying in the final rule only those record system characteristics and practices that DOE believes are essential for achieving successful CBDPPs.

Section 850.39(g) requires the responsible employer to transmit all records required by this rule, in a format that protects the confidentiality of individuals, to the DOE Assistant Secretary for Environment, Safety and Health on request. DOE replaced "Headquarters" in the proposed rule with "Assistant Secretary for Environment, Safety and Health" in the final rule to clarify that DOE's Office of Environment, Safety and Health is the DOE organization that is responsible for conducting occupational health studies that involve DOE workers.

Section 850.39(h) requires the responsible employer semi-annually to transmit to the DOE Office of Epidemiologic Studies, Office of Environment, Safety and Health, an electronic registry of beryllium-associated workers. The transmitted registry must protect confidentiality and include (but is not limited to) the following information for each worker in the registry: a unique identifier, date of birth, gender, site, job history, medical screening test results, exposure measurements, and results of referrals for specialized medical evaluations. DOE's collection of this information conforms to DOE Record System 88, "Epidemiologic and Other Studies, Surveys, and Surveillance," established as required by the Privacy Act. The Office of Epidemiologic Surveillance is responsible for administrative and policy decisions related to the beryllium registry and provides technical support to the SOMD.

The medical records generated by the CBDPP will be kept in appropriate agency Privacy Act systems of records, such as DOE–33, "Personnel Medical Records," and/or DOE–88, and will be afforded the protection provided by the Privacy Act. Should the agency receive a request for these records, it will use every argument legally and reasonably available to it, including the authority granted under the FOIA and the Privacy Act and the agency's regulations implementing those statutes, to protect the privacy of individuals in the records generated by the CBDPP. DOE's policy expressed in 10 CFR 1004.3(e)(ii), to maximize public disclosure of records that pertain to concerns about the environment, public health or safety, or employee grievances, has never been applied to jeopardize the privacy interests of individuals in their medical records and will not be applied to jeopardize privacy interests in records generated by the CBDPP.

Section 850.39(h) includes "exposure measurements" in the registry as recommended by a commenter (Ex. 14). DOE had inadvertently omitted exposure measurements in the proposed registry provision. Also, section 850.39(h) includes beryllium-associated workers as recommended by a commenter (Ex. 28), rather than the narrower category of beryllium workers as proposed. DOE accepts this recommended change because it recognizes that some DOE workers who currently do not perform tasks involving beryllium are nonetheless at risk of contracting CBD (based on past potential exposure to beryllium) and must be included to complete the registry.

DOE proposed including beryllium-associated workers' names and social security numbers in the data that would be included in the beryllium registry. Several commenters (Exs. 16, 23, 28) argued that including the names and social security numbers of the beryllium-associated workers in the registry would compromise their privacy. DOE has responded to these commenters' concerns by replacing the proposed "names" and "social security numbers" with "unique identifier." The term "unique identifier" is defined in section 850.3(a) to mean the part of a paired set of labels, used in records that contain confidential information, that does not identify individuals except by using the matching label. Only the SOMD will have the key to match the unique identifier to the individual. This approach allows health and safety professionals and researchers to access the registry data and allows the SOMD to inform individuals of relevant study results, while maintaining confidentiality at all times.

The beryllium registry will serve as a repository for information on beryllium-associated workers. DOE will use the registry to determine the exposure profile and disease status of beryllium-associated workers, and provide feedback to the responsible employer on the effectiveness of the CBDPP. The registry will give DOE the ability to combine data from different facilities and perform analyses that are impossible to perform with the small amount of data that is available from each individual facility. The combined data may help DOE identify risk factors for CBD and evaluate the predictive value of medical tests such as the Be-LPT. Also, researchers may use the registry to conduct further epidemiological studies to better understand the cause and development of CBD and better identify those at risk.

One commenter (Ex. 26) recommended that DOE delete the beryllium registry from the final rule because the commenter believes that: (1) DOE has not adequately described the research for which it will be used, and (2) implementing the registry will be costly. This commenter suggested, as an alternative, that DOE retain the beryllium registry, but include in the rule the specific research protocol that would be used. DOE does not agree with the commenter. DOE is confident that the registry as provided in the final rule will support the studies needed to better understand the relationship between workplace conditions and CBD. This knowledge should provide the basis for improved worker protections. DOE also thinks that the expense of the registry is well justified by these benefits. DOE also disagrees with the recommended alternative of including the research protocols in this rule. Stipulating research protocols in regulations that could only be changed through notice-and-comment rulemaking could stifle research activities.

One commenter (Ex. 19) expressed the concern that DOE's Office of Environment, Safety, and Health use of the beryllium registry could overshadow important site-specific studies. DOE believes that studies at both the site and national level are important for understanding the relationship between workplace conditions and CBD. DOE has included section 850.39(d), which requires responsible employers to link data on workplace conditions and health outcomes, in part to facilitate the site level studies. The beryllium registry established by section 850.39(h) will be used by the Office of Epidemiologic Surveillance to support national level studies.

Two commenters (Exs. 19, 23) recommended that the rule require that a university or a university with input from an oversight board, or other suitably qualified organizations design the epidemiological analysis of the CBDPP-generated data. Although responsible employers and DOE's Office of Environment, Safety and Health may use universities or other suitably qualified organizations to design these analyses, DOE thinks it would be inappropriate to specify the use of such organizations in the rule. This recommendation is not adopted.

Section 850.40—Performance Feedback

The final rule requirements for performance feedback in section 850.40 are essentially the same as those proposed. Section 850.40(a) requires that responsible employers conduct periodic analysis and assessment of monitoring results, hazards identified, medical surveillance results, attainment of exposure reduction and minimization goals, and occurrence reporting data. DOE believes that the analysis of these data is important for the continuous improvement of the program.

To ensure that all workers have the information needed to safely perform their assigned tasks, section 850.40(b) requires that results of performance assessments conducted in accordance with this rule be provided to line managers, planners, worker protection staff, workers, medical staff, and others.

LIST OF COMMENTERS

Exhibit No.	Company/Organization
1	Atomic Weapons Establishment (AWE)
2	Oak Ridge Institute for Science and Education (ORISE)
3	U.S. Department of Navy, Navy Environmental Health Center
4	Fluor Daniel Hanford, Incorporated
5	Burlin McKinney
6	Idaho National Engineering and Environmental Laboratory (INEEL), Operated by Lockheed Martin
7	Freddy D. Marler Jr.
8	Alfred Glenn Bell
9	Lockheed Martin Idaho Technologies Company, INEEL
10	A Concerned American Citizen
11	Robert A. Gadon, CIH
12	Daniel R. Roberts, Danny Bush, Willie James Brooks, C.E. Tilley, Robert Lang Freels, Edna & Ernest Hugart, Victoria L. O'Sheel, Kenneth L. Moore, Cheryll A. Dyer, James M. Harvey, J. R. Miller, Luis Revilla, Connie Willis, Bruce Lawson, Lynn & Linda Cox, Roy & Debra Jones
13	American Industrial Hygiene Association (AIHA)
14	Gary Foster
15	Darrell Lawson
16	University of California, Laboratory Administration
17	Hanford Environmental Health Foundation
18	Serious Texans Against Nuclear Dumping (STAND), Incorporated
19	American College of Occupational and Environmental Medicine
20	Occupational Safety and Health Administration (OSHA)
21	University of Cincinnati Medical Center
22	Paper, Allied Industrial Chemical & Energy Workers Union (PACE)
23	Kaiser-Hill Company, Rocky Flats Environmental Technology Site
24	Lockheed Martin Energy Systems, Incorporated, (Y–12 Facility)
25	Lockheed Martin Energy Research Corporation (Oak Ridge Laboratory)
26	Brush Wellman, Incorporated
27	James Turner
28	National Jewish Medical and Research Center
29	National Institute for Occupational Safety and Health (NIOSH)
30	Consortium for Risk Evaluation with Stakeholder Participation (CRESP)
31	International Chemical Workers Union Council of the United Food and Commercial Workers International Union (ICWUC/UFCW)
32	Concerned Citizens for Nuclear Safety (CCNS)
33	Stanford Linear Accelerator Center (SLAC)
34	Fermi National Accelerator Laboratory (Fermi Lab)
35	United Steelworkers, Local 8031
36	U.S. House of Representatives, Van Hilleary
37	National Institute for Occupational Safety and Health (NIOSH)
38	Atomic Weapons Establishment (AWE)
38	Commodore Advance Science, Incorporated
40	Hanford Environmental Health Foundation
41	Oak Ridge National Laboratory
42	Argonne National Laboratory
43	Fluor Daniel Hanford, Incorporated
44	University of Cincinnati Medical Center
45	Gary Foster
46	Pantex Plant
47	Kaiser-Hill, Rocky Flats Environmental Technology Site
48	Paper, Allied Industrial Chemical & Energy Workers Union (PACE)
49	Consortium for Risk Evaluation with Stakeholder Participation (CRESP)
50	Brush Wellman, Incorporated
51	University of Cincinnati

LIST OF COMMENTERS—Continued

Exhibit No.	Company/Organization
52	Building & Construction Trades Department, AFL–CIO

V. Procedural Requirements

A. Review Under Executive Order 12866

This rulemaking has been determined to be a significant regulatory action under Executive Order 12866, "Regulatory Planning and Review," 58 FR 51735 (October 4, 1993). Accordingly, today's action was subject to review under the executive order by the Office of Information and Regulatory Affairs (OIRA). The assessment of the potential costs and benefits of the proposed rule, which was made available to the public when the NOPR was published in the **Federal Register**, was updated to reflect changes made in the final rule.

Before conducting the assessment, DOE profiled the sites and activities that will be affected by the CBDPP rule and estimated the number of workers that will be affected by the rule. DOE estimates that 1,634 workers may be exposed or potentially exposed to airborne concentrations of beryllium in the DOE complex. Furthermore, DOE estimates that 1,236 of these workers (75.6 percent) are potentially exposed above the action level or the PEL prescribed in the CBDPP rule.

DOE began the cost estimation by reviewing the rule to determine which requirements of the rule will impose costs on affected entities. DOE then determined the controls (e.g., implementation of procedures, purchase of equipment) necessary for affected entities to be in compliance with each requirement. DOE's assessment refers to these determinations as compliance profiles. Since the goal of the compliance cost estimation is to determine the incremental costs of compliance (OMB Guidance, 1996), the compliance profiles were compared to the procedures and controls that are currently in place at DOE facilities affected by the rule (i.e., the baseline). Procedures and controls required by the CBDPP rule that are not currently in place at DOE facilities were considered new to the facilities, and thus would impose incremental costs on the affected entities. The compliance profiles were then adjusted to reflect only the required incremental controls.

The next step in DOE's assessment was to estimate the costs for each compliance profile. DOE collected data on the cost of each element contained in the compliance profiles. The profiles are designed to reflect the full opportunity cost of compliance. For example, the compliance profile for performing a Be-LPT test includes not only the test itself, but also the labor time for the worker and physician to conduct the test, shipping the sample to a lab, and analyzing and interpreting the results of the test. The cost data was obtained from a variety of sources, including CBDPP plans submitted under DOE Notice 440.1, a 1999 Environment, Safety and Health (EH) Cost Survey, contact with DOE facilities subject to the CBDPP rule, trade publications, the U.S. Office of Personnel Management (OPM) (e.g., for wage rates), and previous economic analyses of other regulations (e.g., regulatory impact analyses of OSHA health standards). This cost data was then applied to the compliance profiles to determine the costs associated with each profile, providing an estimate of the incremental cost for each requirement.

DOE-wide cost estimates for each requirement were generated by multiplying the number of units affected by each requirement by the incremental cost for each requirement. Costs estimated in this step were then annualized using a discount rate. Discount rates are used to translate costs (and benefits) that are incurred in future years into a present value. Following OMB Guidance (1992), DOE chose a 7 percent discount rate. In the analysis, DOE uses the 7 percent discount rate for three purposes: (1) To annualize the costs of equipment or other program elements that have a lifetime of more than one year, (2) to translate the costs incurred in future years into a present value, and (3) to calculate the annualized cost of initial requirements of DOE N 440.1 and the CBDPP rule.

DOE estimated the total compliance costs of the CBDPP, including the costs of the interim CBDPP under DOE Notice 440.1 and the costs of this final rule. DOE estimates an $8.54 million annualized cost on DOE contractors between July 1997 and December 1999 (compliance with DOE Notice 440.1) and a $31.55 million annualized cost on DOE contractors between December 1999 (the assumed effective date of the final rule) and December 2009. This includes an initial (i.e., startup) cost of $9.02 million incurred in July 1997 and another initial cost of $2.22 million incurred in December 1999.

DOE also assessed the potential benefits of the CBDPP for DOE, DOE contractors, and workers. DOE assessed the following benefits of the CBDPP rule: (1) Reduced medical costs; (2) reduced mortality; (3) increased quality of life; (4) increased medical surveillance for workers at risk; (5) increased work-life for beryllium workers; (6) increased productivity; (7) reduced legal costs for DOE and DOE contractors; and (8) a reduction in the externality associated with beryllium exposure through a transfer of the medical costs from workers to DOE contractors. Because sufficient information on the dose-response relationship for beryllium is not available within the scientific community, DOE could not relate reduced levels of exposure to a specific reduction in CBD and beryllium sensitization. Nevertheless, DOE estimates that the monetary benefits from reduced lifetime medical costs could range from $10,100 to $16,093 for each avoided case of beryllium sensitization or CBD.

DOE also assessed the potential economic impacts of the rule on the provision of public goods that contain beryllium and the impact on the market for beryllium. DOE assessed each of these potential impacts and determined neither will impose a significant economic impact. DOE determined that the potential reduction in the provision of beryllium-containing public goods will be minimal and, consequently, the reduction in demand for beryllium will also be small.

DOE's assessment of the potential costs and benefits of the final has been placed in the rulemaking file (Docket Number EH–RM–98–BRYLM). DOE also has placed in the rulemaking file a document that identifies the substantive changes between the draft final rule submitted to the OIRA for review and the final rule published today, including identification of the changes suggested or recommended by OIRA. These documents may be reviewed and copied at the DOE of Information Reading Room, Room 1E–190, 1000 Independence Avenue, SW, Washington, DC 20585, between the hours of 8:30 a.m. and 4:00 p.m., Monday through Friday, except Federal holidays.

B. Review Under the Regulatory Flexibility Act

The Regulatory Flexibility Act, 5 U.S.C. 601–612, requires that an agency prepare a regulatory flexibility analysis and publish it at the time of publication of general notice of proposed rulemaking for the rule. This requirement does not apply if the agency certifies that the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities (5 U.S.C. 605(b)).

Today's action establishes DOE's regulations for a CBDPP to reduce the number of DOE Federal and contractor workers exposed to beryllium, minimize the levels of and potential for exposure to beryllium, and establish medical surveillance requirements to ensure early detection of disease. The contractors who manage and operate DOE facilities are principally responsible for implementing the CBDPP. DOE has considered whether these contractors are "small businesses," as that term is defined by the Regulatory Flexibility Act (5 U.S.C. 601(3)). The Regulatory Flexibility Act's definition incorporates the definition of "small business concern" in the Small Business Act, which the Small Business Administration (SBA) has developed through size standards in 13 CFR part 121. Small businesses are business concerns which, together with their affiliates, have no more than 500 to 1500 employees, varying by SIC category, and annual receipts of between $0.5 million to $25 million, again varying by SIC category. The DOE contractors subject to the CBDPP requirements exceed the SBA's size standards for small businesses. In addition, DOE contractors are reimbursed through their contracts with DOE for the costs of complying with DOE health and safety program requirements. They will not, therefore, be adversely impacted by the requirements in the rule. For these reasons, DOE certifies that the final rule will not have a significant economic impact on a substantial number of small entities.

C. Review Under the Paperwork Reduction Act

DOE submitted the proposed collections of information in this rule to the Office of Management and Budget for review under section 3507(d) of the Paperwork Reduction Act of 1995 (42 U.S.C. 3507(d)). The information that DOE contractors are required to produce, maintain and report is necessary to permit the Department to manage and oversee the health and safety programs that control worker exposure to beryllium. The Office of Management and Budget has not yet approved the collections of information in this rule. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number (5 CFR 1320.5(b)).

D. Review Under the National Environmental Policy Act

DOE has reviewed the promulgation of 10 CFR Part 850 under the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 *et seq.*), the Council on Environmental Quality regulations for implementing NEPA (40 CFR parts 1500–1508), and DOE's NEPA implementing procedures (10 CFR Part 1021). DOE has completed an Environmental Assessment, and on the basis of that assessment has determined that an environmental impact statement is not required and issued a Finding of No Significant Impact (FONSI) for this rule. In the Notice of Proposed Rulemaking, the Department announced the availability of the draft Environmental Assessment and requested comments on the Assessment. DOE did not receive any comments on the draft Environmental Assessment. The Environmental Assessment updates the draft Environmental Assessment (DOE/EA 1249) to reflect changes in the final rule made in response to public comments on the rule. The Environmental Assessment and FONSI are available for inspection at the DOE Freedom of Information Reading Room, 1E–190, 1000 Independence Avenue SW, Washington, DC 20585, between the hours of 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays.

E. Review Under Executive Order 13132

Executive Order 13132 (64 FR 43255, August 4, 1999), imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or that have federalism implications. Agencies are required to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and carefully assess the necessity for such actions. DOE has examined today's rule and has determined that it does not preempt State law and does not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. No further action is required by Executive Order 13132.

F. Review Under Executive Order 12988

Section 3 of Executive Order 12988, "Civil Justice Reform," 61 FR 4729 (February 7, 1996), instructs each agency to adhere to certain requirements in promulgating new regulations. Executive agencies are required by section 3(a) to adhere to the following general requirements: (1) Eliminate drafting errors and ambiguity; (2) write regulations to minimize litigation; and (3) provide a clear legal standard for affected conduct rather than a general standard and promote simplification and burden reduction. With regard to the review required by section 3(a), section 3(b) of Executive Order 12988 specifically requires that Executive agencies make every reasonable effort to ensure that the regulation: (1) Clearly specifies the preemptive effect, if any; (2) clearly specifies any effect on existing federal law or regulation; (3) provides a clear legal standard for affected conduct while promoting simplification and burden reduction; (4) specifies the retroactive effect, if any; (5) adequately defines key terms; and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires Executive agencies to review regulations in light of applicable standards in section 3(a) and section 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. DOE has completed the required review and determined that this final rule meets the relevant standards of Executive Order 12988.

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) requires each federal agency, to the extent permitted by law, to prepare a written assessment of the effects of any Federal mandate in an agency rule that may result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $100 million in any one year. It also requires a federal agency to develop an effective process to permit timely input by elected officers of State, local, and tribal governments on a proposed "significant Federal intergovernmental mandate," and requires an agency plan for giving notice and an opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. The final rule published today applies only to activities conducted by or for DOE, and its implementation will not result in an expenditure of $100 million in any year by State, local or tribal governments or the private sector. Therefore, the requirements of Title II Unfunded Mandates Reform Act of 1995 do not apply.

H. Review Under Small Business Regulatory Enforcement Fairness Act of 1996

As required by 5 U.S.C. 801, DOE will report to Congress promulgation of this rule prior to its effective date. The report will state that it has been

determined that the rule is not a "major rule" as defined by 5 U.S.C. 804(2).

Appendix A to the Preamble References

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Appendix B to the Preamble—Questions and Answers Concerning the Beryllium-Induced Lymphocyte Proliferation Test (Be-LPT), Medical Records, and the Department of Energy (DOE) Beryllium Registry

What Is the Be-LPT Blood Test?

In the Be-LPTs, disease-fighting blood cells that are normally found in the body, called lymphocytes, are examined in the laboratory and separated from your blood. Beryllium and other test agents are then added to small groups of these lymphocytes. If these lymphocytes react to the beryllium in a specific way, the test results are "positive." If they do not react to beryllium, the test is "negative."

Experts believe that the Be-LPT shows positive results in individuals who have become sensitive or allergic to beryllium. It is unclear what this sensitivity means. Studies have shown it to be an early sign of chronic beryllium disease (CBD) in many individuals. In others, sensitivity might simply mean that the person was exposed to beryllium and that his or her body has reacted. It might mean that an individual is more likely than others to get CBD. You are being offered the Be-LPT because doctors believe it is useful in detecting cases of CBD early or cases that might otherwise be missed or diagnosed as another type of lung problem. Once CBD is identified, doctors can determine the treatment that is needed to minimize the lung damage that CBD causes.

As in any other medical test, the Be-LPT sometimes fails or provides unclear results. The laboratory calls these results "uninterpretable." Even when the test appears successful, it may appear positive when a person is not sensitive or allergic to beryllium. This is called a "false positive" result. It is also

possible that the test will show "negative" results when a person is actually "sensitized" to beryllium. This is a "false negative" result. If you have a "uninterpretable" blood Be-LPT result, you will be asked to provide another blood sample so the test can be repeated. If you have "positive" results, you will be offered further medical tests to confirm or rule out CBD. Remember that you may refuse further tests at this point or at any point during your medical evaluations.

It is important for you to know that if the physical examination or the results from other tests you are receiving suggest that you have CBD, you may be offered further medical tests. These medical tests may be offered even if your Be-LPT is "negative."

Some individuals with confirmed "positive" Be-LPTs but no other signs of CBD have developed the disease. The likelihood of this happening will only be known after large groups of potentially exposed individuals have had their blood tested, have had further medical tests, and are studied for many years.

Do I Have To Have the Be-LPT Done?

No. Your participation in the medical surveillance program is strictly voluntary. You may refuse any of the tests offered to you, including the Be-LPT. If you change your mind, you are free to participate in the program at any time. Talking with your family, your doctor, or other people you trust may help you decide. The physicians in the clinic that provide the tests can also help answer any questions that you might have.

What Will Happen if I Decide To Have the Be-LPT Blood Test?

A small amount of your blood will be drawn from a vein in your arm and sent to a laboratory. There is little physical risk in drawing blood. Slight pain and bruising may occur in a few individuals. Rarely, the needle puncture will become infected. Other routine medical evaluation tests may be offered when you have the Be-LPTs including a physical examination, a chest X-ray, and breathing tests that help find signs of CBD, if they exist.

Other diseases may resemble CBD. Different medical tests can help a physician decide if a person has CBD or another disease. If the examining physician suspects that you have CBD, he or she will recommend additional medical tests to help confirm a diagnosis. Separate information regarding these additional medical tests will be given to you if they are recommended. Your consent will be requested when the extra tests are given. You can always refuse additional tests, if you so choose. Your employer will pay for all tests.

When Will I Receive the Results of My Be-LPT Blood Test?

It could take 2 to 4 weeks for you to receive a letter informing you of your test results. The test itself usually takes 8 days to perform. The testing laboratory reports results to the physician who examined you and he or she will notify you.

Could a Positive Be-LPT Blood Test Affect My Job Assignment?

Yes. If you have a positive Be-LPT or have been diagnosed with CBD, your employer may inform you that the SOMD has recommended that you be temporarily or permanently removed from working with beryllium. You will be given information and counseling to help you decide whether to accept medical removal. If you agree to medical removal, every effort will be made to offer you another job that you are qualified (or can be trained for in a short period) to perform and where the beryllium exposures will be as low as possible, but in no case above the action level.

If you are temporarily removed, you will maintain your total normal earnings, seniority, and other benefits until you are placed in another job for 1 year, whichever comes first. If you are permanently removed, you will maintain your total normal earnings, seniority, and other benefits until you are placed in another job or for 2 years, whichever comes first. If you become physically unable to continue working, you may be eligible for workers' compensation and other benefits.

Will I Lose Any Pay or Any Other Benefits by Having the Examination During Normal Working Hours?

No. Your examination will be scheduled during normal work hours. You will not be required to take leave to have the examination, nor will you lose pay or any other benefits.

What Will Happen to the Records of the Medical Examination Results?

The results of your Be-LPT and other screening tests will be made available to you and, with your consent, to your physician. The information also will become part of your medical record, which the clinic keeps.

The results of tests and examinations in your medical record will be available to the physicians and nurses in this clinic, and possibly to scientists conducting health studies. The test results in your medical records will be kept in specially secured files under the supervision of physicians and nurses in the clinic, separate from other personnel records. Your test results will be medically confidential data and will not be released to anyone other than those listed in the following, unless you provide written permission. The following groups will have direct access to this information:

1. Clinic staff members;
2. Medical specialists who will provide or arrange for additional medical treatment or tests, if necessary;
3. U.S. Department of Energy Beryllium Registry staff; and
4. The Centers for Disease Control and Prevention and the National Institute for Occupational Safety and Health officials may require direct access to records that identify you by name for health studies.

If information about you is used in reports or a published health study, your identity will be disguised. You will not be identified in any published report or presentation.

What Laws Protect Me if I Consent To Participate in the Blood Be-LPT Testing Program?

State medical and nursing licensing boards enforce codes of ethics that require doctors and nurses to keep medical information confidential. The Privacy Act prevents unauthorized access to your DOE records without your permission. The information in records kept by your employer must be handled in accordance with the Americans with Disabilities Act and the Privacy Act of 1974. The consent form you sign also provides additional protection.

Can My Privacy and the Confidentiality of My Medical Records Be Guaranteed?

No. Access to or release of records could be required under court order, or DOE directive, but it is unlikely. It would also be available as the Freedom of Information Act or Privacy Act provide, such as to Congress, to an individual upon a showing of compelling circumstances affecting the health and safety of an individual, etc. If you apply for another job or for insurance, you may be requested to release the records to a future employer or an insurance company. If, for medical reasons, it is recommended that you transfer to an area where you will not contact beryllium, and you elect to do so, the personnel department and your supervisor will be notified. They will not be told the specific results of your tests but, because of the restrictions, they may assume that your Be-LPT results were positive.

What Is the DOE Beryllium Registry?

Your health and the health of all workers is a major concern to DOE. There is a need to learn more about chronic beryllium disease and what causes some individuals to react more strongly than others do. A DOE beryllium registry has been established to collect and maintain information on workers who are exposed to beryllium. This registry is a tool that will be used in health studies to better understand the nature of the disease. With it we can measure the burden of health effects related to beryllium exposure. The registry will also be used to evaluate the effectiveness of exposure control programs.

In addition to information about your beryllium-related exposures, the results of beryllium sensitization testing and/or CBD status collected by your employer will be added to the registry. Your employer must treat this information as confidential medical information and can only use or disclose this information in conformance with the Privacy Act of 1974, the Americans with Disabilities Act, and other applicable laws. Your employer will establish a unique identifier for you that will be included in the registry instead of your personal identifying information (such as your name and social security number). The unique identifier will be used to inform your employer of any study results that you and your employer's Site Occupational Medical Director (SOMD) should know about. The SOMD will know to whom the unique identifier refers and will notify you of these results. At no time will your name or other personal identifying information be included in any report. The confidentiality of personal information in DOE records is protected under the Privacy Act of 1974.

List of Subjects in 10 CFR Part 850

Beryllium, Chronic beryllium disease, Hazardous substances, Lung diseases, Occupational safety and health, Reporting and recordkeeping requirements.

Issued in Washington, D.C., on November 24, 1999.

Bill Richardson,

Secretary of Energy.

For the reason set forth in the preamble, Title 10, Chapter III of the Code of Federal Regulations is amended by adding a new part 850 as set forth below.

PART 850—CHRONIC BERYLLIUM DISEASE PREVENTION PROGRAM

Subpart A—General Provisions

Sec.
850.1 Scope.
850.2 Applicability.
850.3 Definitions.
850.4 Enforcement.
850.5 Dispute resolution.

Subpart B—Administrative Requirements

850.10 Development and approval of the CBDPP.
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850.12 Implementation.
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Subpart C—Specific Program Requirements

850.20 Baseline beryllium inventory.
850.21 Hazard assessment.
850.22 Permissible exposure limit.
850.23 Action level.
850.24 Exposure monitoring.
850.25 Exposure reduction and minimization.
850.26 Regulated areas.
850.27 Hygiene facilities and practices.
850.28 Respiratory protection.
850.29 Protective clothing and equipment.
850.30 Housekeeping.
850.31 Release criteria.
850.32 Waste disposal.
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850.34 Medical surveillance.
850.35 Medical removal.
850.36 Medical consent.
850.37 Training and counseling.
850.38 Warning signs and labels.
850.39 Recordkeeping and use of information.
850.40 Performance feedback.

Appendix A to Part 850—Chronic Beryllium Disease Prevention Program Informed Consent Form.

Authority: 42 U.S.C. 2201(i)(3), (p); 29 U.S.C. 668; E.O. 12196, 3 CFR 1981 comp., p. 145 as amended.

Subpart A—General Provisions

§ 850.1 Scope.

This part establishes a chronic beryllium disease prevention program (CBDPP) that supplements and is integrated into existing worker protection programs that are established for Department of Energy (DOE) employees and DOE contractor employees.

§ 850.2 Applicability.

(a) This part applies to:

(1) DOE offices responsible for operations or activities that involve present or past exposure, or the potential for exposure, to beryllium at DOE facilities;

(2) DOE contractors with operations or activities that involve present or past exposure, or the potential for exposure, to beryllium at DOE facilities; and

(3) Any current DOE employee, DOE contractor employee, or other worker at a DOE facility who is or was exposed or potentially exposed to beryllium at a DOE facility.

(b) This part does not apply to:

(1) Beryllium articles; and

(2) DOE laboratory operations that meet the definition of laboratory use of hazardous chemicals in 29 CFR 1910.1450, Occupational Exposure to Hazardous Chemical in Laboratories.

§ 850.3 Definitions.

(a) As used in this part:

Action level means the level of airborne concentration of beryllium established pursuant to section 850.23 of this part that, if met or exceeded, requires the implementation of worker protection provisions specified in that section.

Authorized person means any person required by work duties to be in a regulated area.

Beryllium means elemental beryllium and any insoluble beryllium compound or alloy containing 0.1 percent beryllium or greater that may be released as an airborne particulate.

Beryllium activity means an activity taken for, or by, DOE at a DOE facility that can expose workers to airborne beryllium, including but not limited to design, construction, operation, maintenance, or decommissioning, and which may involve one DOE facility or operation or a combination of facilities and operations.

Beryllium article means a manufactured item that is formed to a specific shape or design during manufacture, that has end-use functions that depend in whole or in part on its shape or design during end use, and that does not release beryllium or otherwise result in exposure to airborne concentrations of beryllium under normal conditions of use.

Beryllium-associated worker means a current worker who is or was exposed or potentially exposed to airborne concentrations of beryllium at a DOE facility, including:

(1) A beryllium worker;

(2) A current worker whose work history shows that the worker may have been exposed to airborne concentrations of beryllium at a DOE facility;

(3) A current worker who exhibits signs or symptoms of beryllium exposure; and

(4) A current worker who is receiving medical removal protection benefits.

Beryllium emergency means any occurrence such as, but not limited to, equipment failure, container rupture, or failure of control equipment or operations that results in an unexpected

and significant release of beryllium at a DOE facility.

Beryllium-induced lymphocyte proliferation test (Be-LPT) is an in vitro measure of the beryllium antigen-specific, cell-mediated immune response.

Beryllium worker means a current worker who is regularly employed in a DOE beryllium activity.

Breathing zone is defined as a hemisphere forward of the shoulders, centered on the mouth and nose, with a radius of 6 to 9 inches.

DOE means the U.S. Department of Energy.

DOE contractor means any entity under contract with DOE (or its subcontractor) that has responsibility for performing beryllium activities at DOE facilities.

DOE facility means any facility operated by or for DOE.

Head of DOE Field Element means an individual who is the manager or head of the DOE operations office or field office, or any official to whom the Head of DOE Field Element delegates his or her functions under this part.

High-efficiency particulate air (HEPA) filter means a filter capable of trapping and retaining at least 99.97 percent of 0.3 micrometer monodispersed particles.

Immune response refers to the series of cellular events by which the immune system reacts to challenge by an antigen.

Medical removal protection benefits means the employment rights established by section 850.35 of this part for beryllium-associated workers who voluntarily accept temporary or permanent medical removal from beryllium areas following a recommendation by the Site Occupational Medicine Director.

Operational area means an area where workers are routinely in the presence of beryllium as part of their work activity.

Regulated area means an area demarcated by the responsible employer in which the airborne concentration of beryllium exceeds, or can reasonably be expected to exceed, the action level.

Removable contamination means beryllium contamination that can be removed from surfaces by nondestructive means, such as casual contact, wiping, brushing or washing.

Responsible employer means:

(1) For DOE contractor employees, the DOE contractor office that is directly responsible for the safety and health of DOE contractor employees while performing a beryllium activity or other activity at a DOE facility; or

(2) For DOE employees, the DOE office that is directly responsible for the safety and health of DOE Federal employees while performing a beryllium activity or other activity at a DOE facility; and

(3) Any person acting directly or indirectly for such office with respect to terms and conditions of employment of beryllium-associated workers.

Site Occupational Medical Director (SOMD) means the physician responsible for the overall direction and operation of the site occupational medicine program.

Unique identifier means the part of a paired set of labels, used in records that contain confidential information, that does not identify individuals except by using the matching label.

Worker means a person who performs work for or on behalf of DOE, including a DOE employee, an independent contractor, a DOE contractor or subcontractor employee, or any other person who performs work at a DOE facility.

Worker exposure means the exposure of a worker to airborne beryllium that would occur if the worker were not using respiratory protective equipment.

(b) Terms undefined in this part that are defined in the Atomic Energy Act of 1954 shall have the same meaning as under that Act.

§ 850.4 Enforcement.

DOE may take appropriate steps under its contracts with DOE contractors to ensure compliance with this part. These steps include, but are not limited to, contract termination or reduction in fee.

§ 850.5 Dispute resolution.

(a) Subject to paragraphs (b) and (c) of this section, any worker who is adversely affected by an action taken, or failure to act, under this part may petition the Office of Hearings and Appeals for relief in accordance with 10 CFR part 1003, Subpart G.

(b) The Office of Hearings and Appeals may not accept a petition from a worker unless the worker requested the responsible employer to correct the violation, and the responsible employer refused or failed to take corrective action within a reasonable time.

(c) If the dispute relates to a term or condition of employment that is covered by a grievance-arbitration provision in a collective bargaining agreement, the worker must exhaust all applicable grievance-arbitration procedures before filing a petition for relief with the Office of Hearings and Appeals. A worker is deemed to have exhausted all applicable grievance-arbitration procedures if 150 days have passed since the filing of a grievance and a final decision on it has not been issued.

Subpart B—Administrative Requirements

§ 850.10 Development and approval of the CBDPP.

(a) *Preparation and submission of initial CBDPP to DOE.* (1) The responsible employer at a DOE facility must ensure that a CBDPP is prepared for the facility and submitted to the appropriate Head of DOE Field Element before beginning beryllium activities, but no later than April 6, 2000 of this part.

(2) If the CBDPP has separate sections addressing the activities of multiple contractors at the facility, the Head of DOE Field Element will designate a single DOE contractor to review and approve the sections prepared by other contractors, so that a single consolidated CBDPP for the facility is submitted to the Head of DOE Field Element for review and approval.

(b) *DOE review and approval.* The appropriate Head of DOE Field Element must review and approve the CBDPP.

(1) The initial CBDPP and any updates are deemed approved 90 days after submission if they are not specifically approved or rejected by DOE earlier.

(2) The responsible employer must furnish a copy of the approved CBDPP, upon request, to the DOE Assistant Secretary for Environment, Safety and Health or designee, DOE program offices, and affected workers or their designated representatives.

(c) *Update.* The responsible employer must submit an update of the CBDPP to the appropriate Head of DOE Field Element for review and approval whenever a significant change or significant addition to the CBDPP is made or a change in contractors occurs. The Head of DOE Field Element must review the CBDPP at least annually and, if necessary, require the responsible employer to update the CBDPP.

(d) *Labor Organizations.* If a responsible employer employs or supervises beryllium-associated workers who are represented for collective bargaining by a labor organization, the responsible employer must:

(1) Give the labor organization timely notice of the development and implementation of the CBDPP and any updates thereto; and

(2) Upon timely request, bargain concerning implementation of this part, consistent with the Federal labor laws.

§ 850.11 General CBDPP requirements.

(a) The CBDPP must specify the existing and planned operational tasks that are within the scope of the CBDPP. The CBDPP must augment and, to the

extent feasible, be integrated into the existing worker protection programs that cover activities at the facility.

(b) The detail, scope, and content of the CBDPP must be commensurate with the hazard of the activities performed, but in all cases the CBDPP must:

(1) Include formal plans and measures for maintaining exposures to beryllium at or below the permissible exposure level prescribed in § 850.22;

(2) Satisfy each requirement in subpart C of this part;

(3) Contain provisions for:

(i) Minimizing the number of workers exposed and potentially exposed to beryllium;

(ii) Minimizing the number of opportunities for workers to be exposed to beryllium;

(iii) Minimizing the disability and lost work time of workers due to chronic beryllium disease, beryllium sensitization and associated medical care; and

(iv) Setting specific exposure reduction and minimization goals that are appropriate for the beryllium activities covered by the CBDPP to further reduce exposure below the permissible exposure limit prescribed in § 850.22.

§ 850.12 Implementation.

(a) The responsible employer must manage and control beryllium exposures in all DOE beryllium activities consistent with the approved CBDPP.

(b) No person employed by DOE or a DOE contractor may take or cause any action inconsistent with the requirements of:

(1) This part,

(2) An approved CBDPP, and

(3) Any other Federal statute or regulation concerning the exposure of workers to beryllium at DOE facilities.

(c) No task involving potential exposure to airborne beryllium that is outside the scope of the existing CBDPP may be initiated until an update of the CBDPP is approved by the Head of DOE Field Element, except in an unexpected situation and, then, only upon approval of the Head of DOE Field Element.

(d) Nothing in this part precludes a responsible employer from taking any additional protective action that it determines to be necessary to protect the health and safety of workers.

(e) Nothing in this part affects the responsibilities of DOE officials under the Federal Employee Occupational Safety and Health Program (29 CFR part 1960) and related DOE directives.

§ 850.13 Compliance.

(a) The responsible employer must conduct activities in compliance with its CBDPP.

(b) The responsible employer must achieve compliance with all elements of its CBDPP no later than January 7, 2002.

(c) With respect to a particular beryllium activity, the contractor in charge of the activity is responsible for complying with this part. If no contractor is responsible for a beryllium activity, DOE must ensure implementation of, and compliance with, this part.

Subpart C—Specific Program Requirements

§ 850.20 Baseline beryllium inventory.

(a) The responsible employer must develop a baseline inventory of the locations of beryllium operations and other locations of potential beryllium contamination, and identify the workers exposed or potentially exposed to beryllium at those locations.

(b) In conducting the baseline inventory, the responsible employer must:

(1) Review current and historical records;

(2) Interview workers;

(3) Document the characteristics and locations of beryllium at the facility; and

(4) Conduct air, surface, and bulk sampling.

(c) The responsible employer must ensure that:

(1) The baseline beryllium inventory is managed by a qualified individual (e.g., a certified industrial hygienist); and

(2) The individuals assigned to this task have sufficient knowledge and experience to perform such activities properly.

§ 850.21 Hazard assessment.

(a) If the baseline inventory establishes the presence of beryllium, the responsible employer must conduct a beryllium hazard assessment that includes an analysis of existing conditions, exposure data, medical surveillance trends, and the exposure potential of planned activities. The exposure determinants, characteristics and exposure potential of activities must be prioritized so that the activities with the greatest risks of exposure are evaluated first.

(b) The responsible employer must ensure that:

(1) The hazard assessment is managed by a qualified individual (e.g., a certified industrial hygienist); and

(2) The individuals assigned to this task have sufficient knowledge and experience to perform such activities properly.

§ 850.22 Permissible exposure limit.

The responsible employer must assure that no worker is exposed to an airborne concentration of beryllium greater than the permissible exposure limit established in 29 CFR 1910.1000, as measured in the worker's breathing zone by personal monitoring, or a more stringent TWA PEL that may be promulgated by the Occupational Safety and Health Administration as a health standard.

§ 850.23 Action level.

(a) The responsible employer must include in its CBDPP an action level that is no greater than 0.2 $\mu g/m^3$, calculated as an 8-hour TWA exposure, as measured in the worker's breathing zone by personal monitoring.

(b) If an airborne concentration of beryllium is at or above the action level, the responsible employer must implement §§ 850.24(c) (periodic monitoring), 850.25 (exposure reduction and minimization), 850.26 (regulated areas), 850.27 (hygiene facilities and practices), 850.28 (respiratory protection), 850.29 (protective clothing and equipment), and 850.38 (warning signs) of this part.

§ 850.24 Exposure monitoring.

(a) *General.* The responsible employer must ensure that:

(1) Exposure monitoring is managed by a qualified individual (e.g., a certified industrial hygienist); and

(2) The individuals assigned to this task have sufficient industrial hygiene knowledge and experience to perform such activities properly.

(b) *Initial monitoring.* The responsible employer must perform initial monitoring in areas that may have airborne beryllium, as shown by the baseline inventory and hazard assessment. The responsible employer must apply statistically-based monitoring strategies to obtain a sufficient number of sample results to adequately characterize exposures, before reducing or terminating monitoring.

(1) The responsible employer must determine workers' 8-hour TWA exposure levels by conducting personal breathing zone sampling.

(2) Exposure monitoring results obtained within the 12 months preceding the effective date of this part may be used to satisfy this requirement if the measurements were made as provided in paragraph (b)(1) of this section.

(c) *Periodic exposure monitoring.* The responsible employer must conduct

periodic monitoring of workers who work in areas where airborne concentrations of beryllium are at or above the action level. The monitoring must be conducted in a manner and at a frequency necessary to represent workers' exposure, as specified in the CBDPP. This periodic exposure monitoring must be performed at least every 3 months (quarterly).

(d) *Additional exposure monitoring.* The responsible employer must perform additional monitoring if operations, maintenance or procedures change, or when the responsible employer has any reason to suspect such a change has occurred.

(e) *Accuracy of monitoring.* The responsible employer must use a method of monitoring and analysis that has an accuracy of not less than plus or minus 25 percent, with a confidence level of 95 percent, for airborne concentrations of beryllium at the action level.

(f) *Analysis.* The responsible employer must have all samples collected to satisfy the monitoring requirements of this part analyzed in a laboratory accredited for metals by the American Industrial Hygiene Association (AIHA) or a laboratory that demonstrates quality assurance for metals analysis that is equivalent to AIHA accreditation.

(g) *Notification of monitoring results.* (1) The responsible employer must, within 10 working days after receipt of any monitoring results, notify the affected workers of monitoring results in writing. This notification of monitoring results must be:

(i) Made personally to the affected worker; or

(ii) Posted in location(s) that is readily accessible to the affected worker, but in a manner that does not identify the individual to other workers.

(2) If the monitoring results indicate that a worker's exposure is at or above the action level, the responsible employer must include in the notice:

(i) A statement that the action level has been met or exceeded; and

(ii) A description of the corrective action being taken by the responsible employer to reduce the worker's exposure to below the action level, if practicable.

(3) If the monitoring results indicate that worker exposure is at or above the action level, the responsible employer must also notify DOE and the SOMD of these results within 10 working days after receipt.

§ 850. 25 Exposure reduction and minimization.

(a) The responsible employer must ensure that no worker is exposed above the exposure limit prescribed in § 850.22.

(b) The responsible employer must, in addition:

(1) Where exposure levels are at or above the action level, establish a formal exposure reduction and minimization program to reduce exposure levels to below the action level, if practicable. This program must be described in the responsible employer's CBDPP and must include:

(i) Annual goals for exposure reduction and minimization;

(ii) A rationale for and a strategy for meeting the goals;

(iii) Actions that will be taken to achieve the goals; and

(iv) A means of tracking progress towards meeting the goals or demonstrating that the goals have been met.

(2) Where exposure levels are below the action level, implement actions for reducing and minimizing exposures, if practicable. The responsible employer must include in the CBDPP a description of the steps to be taken for exposure reduction and minimization and a rationale for those steps.

(c) The responsible employer must implement exposure reduction and minimization actions using the conventional hierarchy of industrial hygiene controls (*i.e.*, engineering controls, administrative controls, and personal protective equipment in that order).

§ 850.26 Regulated areas.

(a) If airborne concentrations of beryllium in areas in DOE facilities are measured at or above the action level, the responsible employer must establish regulated areas for those areas.

(b) The responsible employer must demarcate regulated areas from the rest of the workplace in a manner that adequately alerts workers to the boundaries of such areas.

(c) The responsible employer must limit access to regulated areas to authorized persons.

(d) The responsible employer must keep records of all individuals who enter regulated areas. These records must include the name, date, time in and time out, and work activity.

§ 850.27 Hygiene facilities and practices.

(a) *General.* The responsible employer must assure that in areas where workers are exposed to beryllium at or above the action level, without regard to the use of respirators:

(1) Food or beverage and tobacco products are not used;

(2) Cosmetics are not applied, except in change rooms or areas and shower facilities required under paragraphs (b) and (c) of this section; and

(3) Beryllium workers are prevented from exiting areas that contain beryllium with contamination on their bodies or their personal clothing.

(b) *Change rooms or areas.* The responsible employer must provide clean change rooms or areas for beryllium workers who work in regulated areas.

(1) Separate facilities free of beryllium must be provided for beryllium workers to change into, and store, personal clothing, and clean protective clothing and equipment to prevent cross-contamination;

(2) The change rooms or areas that are used to remove beryllium-contaminated clothing and protective equipment must be maintained under negative pressure or located so as to minimize dispersion of beryllium into clean areas; and

(c) *Showers and handwashing facilities.* (1) The responsible employer must provide handwashing and shower facilities for beryllium workers who work in regulated areas.

(2) The responsible employer must assure that beryllium workers who work in regulated areas shower at the end of the work shift.

(d) *Lunchroom facilities.* (1) The responsible employer must provide lunchroom facilities that are readily accessible to beryllium workers, and ensure that tables for eating are free of beryllium, and that no worker in a lunchroom facility is exposed at any time to beryllium at or above the action level.

(2) The responsible employer must assure that beryllium workers do not enter lunchroom facilities with protective work clothing or equipment unless the surface beryllium has been removed from clothing and equipment by HEPA vacuuming or other method that removes beryllium without dispersing it.

(e) The change rooms or areas, shower and handwashing facilities, and lunchroom facilities must comply with 29 CFR 1910.141, Sanitation.

§ 850.28 Respiratory protection.

(a) The responsible employer must establish a respiratory protection program that complies with the respiratory protection program requirements of 29 CFR 1910.134, Respiratory Protection.

(b) The responsible employer must provide respirators to, and ensure that they are used by, all workers who:

(1) Are exposed to an airborne concentration of beryllium at or above the action level, or

(2) Are performing tasks for which analyses indicate the potential for exposures at or above the action level.

(c) The responsible employer must include in the respiratory protection program any beryllium-associated worker who requests to use a respirator for protection against airborne beryllium, regardless of measured exposure levels.

(d) The responsible employer must select for use by workers:

(1) Respirators approved by the National Institute for Occupational Safety and Health (NIOSH) if NIOSH-approved respirators exist for a specific DOE task; or

(2) Respirators that DOE has accepted under the DOE Respiratory Protection Acceptance Program if NIOSH-approved respirators do not exist for specific DOE tasks.

§ 850.29 Protective clothing and equipment.

(a) The responsible employer must provide protective clothing and equipment to beryllium workers and ensure its appropriate use and maintenance, where dispersible forms of beryllium may contact worker's skin, enter openings in workers' skin, or contact workers' eyes, including where:

(1) Exposure monitoring has established that airborne concentrations of beryllium are at or above the action level;

(2) Surface contamination levels measured or presumed prior to initiating work are above the level prescribed in § 850.30;

(3) Surface contamination levels results obtained to confirm housekeeping efforts are above the level prescribed in § 850.30; and

(4) Any beryllium-associated worker who requests the use of protective clothing and equipment for protection against airborne beryllium, regardless of measured exposure levels.

(b) The responsible employer must comply with 29 CFR 1910.132, Personal Protective Equipment General Requirements, when workers use personal protective clothing and equipment.

(c) The responsible employer must establish procedures for donning, doffing, handling, and storing protective clothing and equipment that:

(1) Prevent beryllium workers from exiting areas that contain beryllium with contamination on their bodies or their personal clothing; and

(2) Include beryllium workers exchanging their personal clothing for full-body protective clothing and footwear before they begin work in regulated areas.

(d) The responsible employer must ensure that no worker removes beryllium-contaminated protective clothing and equipment from areas that contain beryllium, except for workers authorized to launder, clean, maintain, or dispose of the clothing and equipment.

(e) The responsible employer must prohibit the removal of beryllium from protective clothing and equipment by blowing, shaking, or other means that may disperse beryllium into the air.

(f) The responsible employer must ensure that protective clothing and equipment is cleaned, laundered, repaired, or replaced as needed to maintain effectiveness. The responsible employer must:

(1) Ensure that beryllium-contaminated protective clothing and equipment, when removed for laundering, cleaning, maintenance, or disposal, is placed in containers that prevent the dispersion of beryllium dust and that are labeled in accordance with § 850.38 of this part; and

(2) Inform organizations that launder or clean DOE beryllium-contaminated protective clothing or equipment that exposure to beryllium is potentially harmful, and that clothing and equipment should be laundered or cleaned in a manner prescribed by the responsible employer to prevent the release of airborne beryllium.

§ 850.30 Housekeeping.

(a) Where beryllium is present in operational areas of DOE facilities, the responsible employer must conduct routine surface sampling to determine housekeeping conditions. Surfaces contaminated with beryllium dusts and waste must not exceed a removable contamination level of 3 $\mu g/100\ cm^2$ during non-operational periods. This sampling would not include the interior of installed closed systems such as enclosures, glove boxes, chambers, or ventilation systems.

(b) When cleaning floors and surfaces in areas where beryllium is present at DOE facilities, the responsible employer must clean beryllium-contaminated floors and surfaces using a wet method, vacuuming or other cleaning methods, such as sticky tack cloths, that avoid the production of airborne dust. Compressed air or dry methods must not be used for such cleaning.

(c) The responsible employer must equip the portable or mobile vacuum units that are used to clean beryllium-contaminated areas with HEPA filters, and change the filters as often as needed to maintain their capture efficiency.

(d) The responsible employer must ensure that the cleaning equipment that is used to clean beryllium-contaminated surfaces is labeled, controlled, and not used for non-hazardous materials.

§ 850.31 Release criteria.

(a) The responsible employer must clean beryllium-contaminated equipment and other items to the lowest contamination level practicable, but not to exceed the levels established in paragraphs (b) and (c) of this section, and label the equipment or other items, before releasing them to the general public or a DOE facility for non-beryllium use, or to another facility for work involving beryllium.

(b) Before releasing beryllium-contaminated equipment or other items to the general public or for use in a non-beryllium area of a DOE facility, the responsible employer must ensure that:

(1) The removable contamination level of equipment or item surfaces does not exceed the higher of 0.2 $\mu g/100\ cm^2$ or the concentration level of beryllium in soil at the point or release, whichever is greater;

(2) The equipment or item is labeled in accordance with § 850.38(b); and

(3) The release is conditioned on the recipient's commitment to implement controls that will prevent foreseeable beryllium exposure, considering the nature of the equipment or item and its future use and the nature of the beryllium contamination.

(c) Before releasing beryllium-contaminated equipment or other items to another facility performing work with beryllium, the responsible employer must ensure that:

(1) The removable contamination level of equipment or item surfaces does not exceed 3 $\mu g/100\ cm^2$;

(2) The equipment or item is labeled in accordance with § 850.38(b); and

(3) The equipment or item is enclosed or placed in sealed, impermeable bags or containers to prevent the release of beryllium dust during handling and transportation.

§ 850.32 Waste disposal.

(a) The responsible employer must control the generation of beryllium-containing waste, and beryllium-contaminated equipment and other items that are disposed of as waste, through the application of waste minimization principles.

(b) Beryllium-containing waste, and beryllium-contaminated equipment and other items that are disposed of as waste, must be disposed of in sealed, impermeable bags, containers, or

enclosures to prevent the release of beryllium dust during handling and transportation. The bags, containers, and enclosures that are used for disposal of beryllium waste must be labeled according to § 850.38.

§ 850.33 Beryllium emergencies.

(a) The responsible employer must comply with 29 CFR 1910.120(l) for handling beryllium emergencies related to decontamination and decommissioning operations.

(b) The responsible employer must comply with 29 CFR 1910.120(q) for handling beryllium emergencies related to all other operations.

§ 850.34 Medical surveillance.

(a) *General.* (1) The responsible employer must establish and implement a medical surveillance program for beryllium-associated workers who voluntarily participate in the program.

(2) The responsible employer must designate a Site Occupational Medical Director (SOMD) who is responsible for administering the medical surveillance program.

(3) The responsible employer must ensure that the medical evaluations and procedures required by this section are performed by, or under the supervision of, a licensed physician who is familiar with the health effects of beryllium.

(4) The responsible employer must establish, and maintain, a list of beryllium-associated workers who may be eligible for protective measures under this part. The list must be:

(i) Based on the hazard assessment, exposure records, and other information regarding the identity of beryllium-associated workers; and

(ii) Adjusted at regular intervals based on periodic evaluations of beryllium-associated workers performed under paragraph (b)(2) of this section;

(5) The responsible employer must provide the SOMD with the information needed to operate and administer the medical surveillance program, including the:

(i) List of beryllium-associated workers required by paragraph (a)(4) of this section;

(ii) Baseline inventory;

(iii) Hazard assessment and exposure monitoring data;

(iv) Identity and nature of activities or operations on the site that are covered under the CBDPP, related duties of beryllium-associated workers; and

(v) Type of personal protective equipment used.

(6) The responsible employer must provide the following information to the SOMD and the examining physician:

(i) A copy of this rule and its preamble;

(ii) A description of the worker's duties as they pertain to beryllium exposure;

(iii) Records of the worker's beryllium exposure; and

(iv) A description of the personal protective and respiratory protective equipment used by the worker in the past, present, or anticipated future use.

(b) *Medical evaluations and procedures.* The responsible employer must provide, to beryllium-associated workers who voluntarily participate in the medical surveillance program, the medical evaluations and procedures required by this section at no cost and at a time and place that is reasonable and convenient to the worker.

(1) *Baseline medical evaluation.* The responsible employer must provide a baseline medical evaluation to beryllium-associated workers. This evaluation must include:

(i) A detailed medical and work history with emphasis on past, present, and anticipated future exposure to beryllium;

(ii) A respiratory symptoms questionnaire;

(iii) A physical examination with special emphasis on the respiratory system, skin and eyes;

(iv) A chest radiograph (posterior-anterior, 14 x 17 inches) interpreted by a National Institute for Occupational Safety and Health (NIOSH) B-reader of pneumoconiosis or a board-certified radiologist (unless a baseline chest radiograph is already on file);

(v) Spirometry consisting of forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV1);

(vi) A Be-LPT; and

(vii) Any other tests deemed appropriate by the examining physician for evaluating beryllium-related health effects.

(2) *Periodic evaluation.* (i) The responsible employer must provide to beryllium workers a medical evaluation annually, and to other beryllium-associated workers a medical evaluation every three years. The periodic medical evaluation must include:

(A) A detailed medical and work history with emphasis on past, present, and anticipated future exposure to beryllium;

(B) A respiratory symptoms questionnaire;

(C) A physical examination with emphasis on the respiratory system;

(D) A Be-LPT; and

(E) Any other medical evaluations deemed appropriate by the examining physician for evaluating beryllium-related health effects.

(ii) The responsible employer must provide to beryllium-associated workers a chest radiograph every five years.

(3) *Emergency evaluation.* The responsible employer must provide a medical evaluation as soon as possible to any worker who may have been exposed to beryllium because of a beryllium emergency. The medical evaluation must include the requirements of paragraph (b)(2) of this section.

(c) *Multiple physician review.* The responsible employer must establish a multiple physician review process for beryllium-associated workers that allows for the review of initial medical findings, determinations, or recommendations from any medical evaluation conducted pursuant to paragraph (b) of this section.

(1) If the responsible employer selects the initial physician to conduct any medical examination or consultation provided to a beryllium-associated worker, the worker may designate a second physician to:

(i) Review any findings, determinations, or recommendations of the initial physician; and

(ii) Conduct such examinations, consultations and laboratory tests, as the second physician deems necessary to facilitate this review.

(2) The responsible employer must promptly notify a beryllium-associated worker in writing of the right to seek a second medical opinion after the initial physician provided by the responsible employer conducts a medical examination or consultation.

(3) The responsible employer may condition its participation in, and payment for, multiple physician review upon the beryllium-associated worker doing the following within fifteen (15) days after receipt of the notice, or receipt of the initial physician's written opinion, whichever is later:

(i) Informing the responsible employer in writing that he or she intends to seek a second medical opinion; and

(ii) Initiating steps to make an appointment with a second physician.

(4) If the findings, determinations, or recommendations of the second physician differ from those of the initial physician, then the responsible employer and the beryllium-associated worker must make efforts to encourage and assist the two physicians to resolve any disagreement.

(5) If, despite the efforts of the responsible employer and the beryllium-associated worker, the two physicians are unable to resolve their disagreement, then the responsible employer and the worker, through their respective physicians, must designate a third physician to:

(i) Review any findings, determinations, or recommendations of the other two physicians; and

(ii) Conduct such examinations, consultations, laboratory tests, and consultations with the other two physicians, as the third physician deems necessary to resolve the disagreement among them.

(6) The SOMD must act consistently with the findings, determinations, and recommendations of the third physician, unless the SOMD and the beryllium-associated worker reach an agreement that is consistent with the recommendations of at least one of the other two physicians.

(d) *Alternate physician determination.* The responsible employer and the beryllium-associated worker or the worker's designated representative may agree upon the use of any alternate form of physician determination in lieu of the multiple physician review process provided by paragraph (c) of this section, so long as the alternative is expeditious and at least as protective of the worker.

(e) *Written medical opinion and recommendation.* (1) Within two weeks of receipt of results, the SOMD must provide to the responsible employer a written, signed medical opinion for each medical evaluation performed on each beryllium-associated worker. The written opinion must take into account the findings, determinations and recommendations of the other examining physicians who may have examined the beryllium-associated worker. The SOMD's opinion must contain:

(i) The diagnosis of the worker's condition relevant to occupational exposure to beryllium, and any other medical condition that would place the worker at increased risk of material impairment to health from further exposure to beryllium;

(ii) Any recommendation for removal of the worker from DOE beryllium activities, or limitation on the worker's activities or duties or use of personal protective equipment, such as a respirator; and

(iii) A statement that the SOMD or examining physician has clearly explained to the worker the results of the medical evaluation, including all tests results and any medical condition related to beryllium exposure that requires further evaluation or treatment.

(2) The SOMD's written medical opinion must not reveal specific records, findings, and diagnoses that are not related to medical conditions that may be affected by beryllium exposure.

(f) *Information provided to the beryllium-associated worker.* (1) The SOMD must provide each beryllium-associated worker with a written medical opinion containing the results of all medical tests or procedures, an explanation of any abnormal findings, and any recommendation that the worker be referred for additional testing for evidence of CBD, within 10 working days after the SOMD's receipt of the results of the medical tests or procedures.

(2) The responsible employer must, within 30 days after a request by a beryllium-associated worker, provide the worker with the information the responsible employer is required to provide the examining physician under paragraph (a)(6) of this section.

(g) *Reporting.* The responsible employer must report on the applicable OSHA reporting form beryllium sensitization, CBD, or any other abnormal condition or disorder of workers caused or aggravated by occupational exposure to beryllium.

(h) *Data analysis.* (1) The responsible employer must routinely and systematically analyze medical, job, and exposure data with the aim of identifying individuals or groups of individuals potentially at risk for CBD and working conditions that are contributing to that risk.

(2) The responsible employer must use the results of these analyses to identify additional workers to whom the responsible employer must provide medical surveillance and to determine the need for additional exposure controls.

§ 850.35 Medical removal.

(a) *Medical removal protection.* The responsible employer must offer a beryllium-associated worker medical removal from exposure to beryllium if the SOMD determines in a written medical opinion that it is medically appropriate to remove the worker from such exposure. The SOMD's determination must be based on one or more positive Be-LPT results, chronic beryllium disease diagnosis, an examining physician's recommendation, or any other signs or symptoms that the SOMD deems medically sufficient to remove a worker.

(1) *Temporary removal pending final medical determination.* The responsible employer must offer a beryllium-associated worker temporary medical removal from exposure to beryllium on each occasion that the SOMD determines in a written medical opinion that the worker should be temporarily removed from such exposure pending a final medical determination of whether the worker should be removed permanently.

(i) In this section, "final medical determination" means the outcome of the multiple physician review process or the alternate medical determination process provided for in paragraphs (c) and (d) of § 850.34.

(ii) If a beryllium-associated worker is temporarily removed from beryllium exposure pursuant to this section, the responsible employer must transfer the worker to a comparable job for which the worker is qualified (or for which the worker can be trained in a short period) and where beryllium exposures are as low as possible, but in no event at or above the action level.

(iii) The responsible employer must maintain the beryllium-associated worker's total normal earnings, seniority, and other worker rights and benefits as if the worker had not been removed.

(iv) If there is no such job available, the responsible employer must provide to the beryllium-associated worker the medical removal protection benefits specified in paragraph (b)(2) of this section, until a job becomes available or for one year, whichever comes first.

(2) *Permanent medical removal.* (i) The responsible employer must offer a beryllium-associated worker permanent medical removal from exposure to beryllium if the SOMD determines in a written medical opinion that the worker should be permanently removed from exposure to beryllium.

(ii) If a beryllium-associated worker is removed permanently from beryllium exposure based on the SOMD's recommendation pursuant to this section, the responsible employer must provide the worker the medical removal protection benefits specified in paragraph (b) of this section.

(3) *Worker consultation before temporary or permanent medical removal.* If the SOMD determines that a beryllium-associated worker should be temporarily or permanently removed from exposure to beryllium, the SOMD must:

(i) Advise the beryllium-associated worker of the determination that medical removal is necessary to protect the worker's health;

(ii) Provide the beryllium-associated worker with a copy of this rule and its preamble, and any other information the SOMD deems necessary on the risks of continued exposure to beryllium and the benefits of removal;

(iii) Provide the beryllium-associated worker the opportunity to have any questions concerning medical removal answered; and

(iv) Obtain the beryllium-associated worker's signature acknowledging that the worker has been advised to accept

medical removal from beryllium exposure as provided in this section, and has been provided with the information specified in this paragraph, on the benefits of removal and the risks of continued exposure to beryllium.

(4) *Return to work after medical removal.* (i) The responsible employer, subject to paragraph (a)(4)(ii) of this section, must not return a beryllium-associated worker who has been permanently removed under this section to the worker's former job status unless the SOMD first determines in a written medical opinion that continued medical removal is no longer necessary to protect the worker's health.

(ii) Not withstanding paragraph (a)(4)(i) of this section, if, in the SOMD's opinion, continued exposure to beryllium will not pose an increased risk to the beryllium-associated worker's health, and medical removal is an inappropriate remedy in the circumstances, the SOMD must fully discuss these matters with the worker and then, in a written determination, may authorize the responsible employer to return the worker to his or her former job status. Thereafter, the returned beryllium-associated worker must continue to be provided with medical surveillance under § 850.34 of this part.

(b) *Medical removal protection benefits.* (1) If a beryllium-associated worker has been permanently removed from beryllium exposure pursuant to paragraph (a)(2) of this section, the responsible employer must provide the beryllium-associated worker:

(i) The opportunity to transfer to another position which is available, or later becomes available, for which the beryllium-associated worker is qualified (or for which the worker can be trained in a short period) and where beryllium exposures are as low as possible, but in no event at or above the action level; or

(ii) If the beryllium-associated worker cannot be transferred to a comparable job where beryllium exposures are below the action level, a maximum of 2 years of permanent medical removal protection benefits (specified in paragraph (b)(2) of this section).

(2) If required by this section to provide medical removal protection benefits, the responsible employer must maintain the removed worker's total normal earnings, seniority and other worker rights and benefits, as though the worker had not been removed.

(3) If a removed beryllium-associated worker files a claim for workers' compensation payments for a beryllium-related disability, then the responsible employer must continue to provide medical removal protection benefits pending disposition of the claim. The responsible employer must receive no credit for the workers' compensation payments received by the worker for treatment related expenses.

(4) The responsible employer's obligation to provide medical removal protection benefits to a removed beryllium-associated worker is reduced to the extent that the worker receives compensation for earnings lost during the period of removal either from a publicly- or employer-funded compensation program, or from employment with another employer made possible by virtue of the worker's removal.

(5) For the purposes of this section, the requirement that a responsible employer provide medical removal protection benefits is not intended to expand upon, restrict, or change any rights to a specific job classification or position under the terms of an applicable collective bargaining agreement.

(6) The responsible employer may condition the provision of medical removal protection benefits upon the beryllium-associated worker's participation in medical surveillance provided in accordance with § 850.34 of this part.

§ 850.36 Medical consent.

(a) The responsible employer must provide each beryllium-associated worker with a summary of the medical surveillance program established in § 850.34 at least one week before the first medical evaluation or procedure or at any time requested by the worker. This summary must include:

(1) The type of data that will be collected in the medical surveillance program;

(2) How the data will be collected and maintained;

(3) The purpose for which the data will be used; and

(4) A description of how confidential data will be protected.

(b) Responsible employers must also provide each beryllium-associated worker with information on the benefits and risks of the medical tests and examinations available to the worker at least one week prior to any such examination or test, and an opportunity to have the worker's questions answered.

(c) The responsible employer must have the SOMD obtain a beryllium-associated worker's signature on the informed consent form found in Appendix A to this part, before performing medical evaluations or any tests.

§ 850.37 Training and counseling.

(a) The responsible employer must develop and implement a beryllium training program and ensure participation for:

(1) Beryllium-associated workers;

(2) All other individuals who work at a site where beryllium activities are conducted.

(b) The training provided for workers identified in paragraph (a)(1) of this section, must:

(1) Be in accordance with 29 CFR 1910.1200, Hazard Communication;

(2) Include the contents of the CBDPP; and

(3) Include potential health risks to beryllium worker family members and others who may come in contact with beryllium on beryllium workers or beryllium workers' personal clothing or other personal items as the result of a beryllium control failure at a DOE facility.

(c) The training provided for workers identified in paragraph (a)(2) of this section must consist of general awareness about beryllium hazards and controls.

(d) The responsible employer must provide the training required by this section before or at the time of initial assignment and at least every two years thereafter.

(e) The employer must provide retraining when the employer has reason to believe that a beryllium worker lacks the proficiency, knowledge, or understanding needed to work safely with beryllium, including at least the following situations:

(1) To address any new beryllium hazards resulting from a change to operations, procedures, or beryllium controls about which the beryllium worker was not previously trained; and

(2) If a beryllium worker's performance involving beryllium work indicates that the worker has not retained the requisite proficiency.

(f) The responsible employer must develop and implement a counseling program to assist beryllium-associated workers who are diagnosed by the SOMD to be sensitized to beryllium or to have CBD. This counseling program must include communicating with beryllium-associated workers concerning:

(1) The medical surveillance program provisions and procedures;

(2) Medical treatment options;

(3) Medical, psychological, and career counseling;

(4) Medical benefits;

(5) Administrative procedures and workers rights under applicable Workers' Compensation laws and regulations;

(6) Work practice procedures limiting beryllium-associated worker exposure to beryllium; and

(7) The risk of continued beryllium exposure after sensitization.

§ 850.38 Warning signs and labels.

(a) *Warning signs.* The responsible employer must post warning signs at each access point to a regulated area with the following information:

DANGER
BERYLLIUM CAN CAUSE LUNG DAMAGE
CANCER HAZARD
AUTHORIZED PERSONNEL ONLY

(b) *Warning labels.* (1) The responsible employer must affix warning labels to all containers of beryllium, beryllium compounds, or beryllium-contaminated clothing, equipment, waste, scrap, or debris.

(2) Warning labels must contain the following information:

DANGER
CONTAMINATED WITH BERYLLIUM
DO NOT REMOVE DUST BY BLOWING OR SHAKING
CANCER AND LUNG DISEASE HAZARD

(c) Warning signs and labels must be in accordance with 29 CFR 1910.1200, Hazard Communication.

§ 850. 39 Recordkeeping and use of information.

(a) The responsible employer must establish and maintain accurate records of all beryllium inventory information, hazard assessments, exposure measurements, exposure controls, and medical surveillance.

(b) Heads of DOE Departmental Elements must:

(1) Designate all record series as required under this rule as agency records and, therefore, subject to all applicable agency records management and access laws; and

(2) Ensure that these record series are retained for a minimum of seventy-five years.

(c) The responsible employer must convey to DOE or its designee all record series required under this rule if the employer ceases to be involved in the CBDPP.

(d) The responsible employer must link data on workplace conditions and health outcomes in order to establish a basis for understanding the beryllium health risk.

(e) The responsible employer must ensure the confidentiality of all work-related records generated under this rule by ensuring that:

(1) All records that are transmitted to other parties do not contain names, social security numbers or any other variables, or combination of variables, that could be used to identify particular individuals; and

(2) Individual medical information generated by the CBDPP is:

(i) Either included as part of the worker's site medical records and maintained by the SOMD, or is maintained by another physician designated by the responsible employer;

(ii) Maintained separately from other records; and

(iii) Used or disclosed by the responsible employer only in conformance with any applicable requirements imposed by the Americans with Disabilities Act, the Privacy Act of 1974, the Freedom of Information Act, and any other applicable law.

(f) The responsible employer must maintain all records required by this part in current and accessible electronic systems, which include the ability readily to retrieve data in a format that maintains confidentiality.

(g) The responsible employer must transmit all records generated as required by this rule, in a format that protects the confidentiality of individuals, to the DOE Assistant Secretary for Environment, Safety and Health on request.

(h) The responsible employer must semi-annually transmit to the DOE Office of Epidemiologic Studies within the Office of Environment, Safety and Health an electronic registry of beryllium-associated workers that protects confidentiality, and the registry must include, but is not limited to, a unique identifier, date of birth, gender, site, job history, medical screening test results, exposure measurements, and results of referrals for specialized medical evaluations.

§ 850.40 Performance feedback.

(a) The responsible employer must conduct periodic analyses and assessments of monitoring activities, hazards, medical surveillance, exposure reduction and minimization, and occurrence reporting data.

(b) To ensure that information is available to maintain and improve all elements of the CBDPP continuously, the responsible employer must give results of periodic analyses and assessments to the line managers, planners, worker protection staff, workers, medical staff, and labor organizations representing beryllium-associated workers who request such information.

Appendix A to Part 850—Chronic Beryllium Disease Prevention Program Informed Consent Form

I, have carefully read and understand the attached information about the Be-LPT and other medical tests. I have had the opportunity to ask any questions that I may have had concerning these tests.

I understand that this program is voluntary and I am free to withdraw at any time from all or any part of the medical surveillance program. I understand that the tests are confidential, but not anonymous. I understand that if the results of any test suggest a health problem, the examining physician will discuss the matter with me, whether or not the result is related to my work with beryllium. I understand that my employer will be notified of my diagnosis only if I have a beryllium sensitization or chronic beryllium disease. My employer will not receive the results or diagnoses of any health conditions not related to beryllium exposure.

I understand that, if the results of one or more of these tests indicate that I have a health problem that is related to beryllium, additional examinations will be recommended. If additional tests indicate I do have a beryllium sensitization or CBD, the Site Occupational Medical Director may recommend that I be removed from working with beryllium. If I agree to be removed, I understand that I may be transferred to another job for which I am qualified (or can be trained for in a short period) and where my beryllium exposures will be as low as possible, but in no case above the action level. I will maintain my total normal earnings, seniority, and other benefits for up to two years if I agree to be permanently removed.

I understand that if I apply for another job or for insurance, I may be requested to release my medical records to a future employer or an insurance company.

I understand that my employer will maintain all medical information relative to the tests performed on me in segregated medical files separate from my personnel files, treated as confidential medical records, and used or disclosed only as provided by the Americans with Disability Act, the Privacy Act of 1974, or as required by a court order or under other law.

I understand that the results of my medical tests for beryllium will be included in the Beryllium Registry maintained by DOE, and that a unique identifier will be used to maintain the confidentiality of my medical information. Personal identifiers will not be included in any reports generated from the DOE Beryllium Registry. I understand that the results of my tests and examinations may be published in reports or presented at meetings, but that I will not be identified.

I consent to having the following medical evaluations:

/ / Physical examination concentrating on my lungs and breathing
/ / Chest X-ray
/ / Spirometry (a breathing test)
/ / Blood test called the beryllium-induced lymphocyte proliferation test or Be-LPT
/ / Other test(s). Specify:

Signature of Participant:

Date:

I have explained and discussed any questions that the employee expressed concerning the Be-LPT, physical examination, and other medical testing as well as the implications of those tests.

Name of Examining Physician:

Signature of Examining Physician:

Dated:

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CONTRACT MODIFICATION M040
BROOKHAVEN SCIENCE ASSOCIATES, LLC
CONTRACT NO DE-ACO2-98CH10886

MOD NO.	INCREASED AMOUNT	REMARKS
A035	$ 81,747,594.31	
A036	947,175.00	
A037	235,431,302.21	
A038	8,840,600.12	
A039	14,557,430.93	
TOTAL	**$ 341,524,102.57**	

CONTRACT MODIFICATION M040
BROOKHAVEN SCIENCE ASSOCIATES, LLC
CONTRACT NO. DE-ACO2-98CH10886

CURRENT BSA CONTRACT AMOUNT (THRU MOD M034, INCL.)	**780,714,075.26**
INCREASED AMOUNT (MODIFICATION A035 - A039)	**341,524,102.57**
NEW CONTRACT TOTAL	**1,122,238,177.83**