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THE IMPLICATIONS OF THE PROPOSED 10CFR20 CHANGES

UPON THE RADIATION PROTECTION DEPARTMENT

at

CLINTON POWER STATION

June 9, 1989

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AA38-2

THE IMPLICATIONS OF THE PROPOSED 10CFR20 CHANGES UPON THE RADIATION PROTECTION DEPARTMENT

EXECUTIVE SUMMARY

The Proposed Revision to Title 10, Code of Federal Regulations, Part 20 (10 CFR 20) has been five years in draft and comment. The announced date of issue is January 1, 1991.

Prudent lincensees are assessing the impact to various programs. The impact evaluations permit reasonably accurate estimates of cost for both the implementation on changes to comply with the revised 10CFR20, and the added annual costs to maintain compliance.

Detailed planning and scheduling should follow this assessment to provide the most effective approach to bring the Program into compliance. The broad revisions to the regulations will require a broad based effort both in the planning and in the effort during the time of implementation.

The Proposed Revision to the regulations are extensive. The current version is 30 years old. They have had patchwork revisions that have not always been well placed nor integrated into the main body of rules. Many programs formerly addressed in Regulatory Guidance, NUREGs, or Branch Technical Position Papers, have been made integral to Part 20. The revisions have addressed International Radiation Protection Standards, to achieve a better level of uniformity with other nations. Scientific data of more recent research, has been incorporated to provide more accurate dosimetric bases. Several new regulatory requirements have been incorporated to fill apparent voids in the current regulations. The major changes and additions are not without controversy. While some of the limits and requirements have been made more restrictive, others have seemingly been relaxed.

Major change and revision of regulations impacting an industry nation-wide, is not implemented without cost. While not originally part of this assessment, costs could not be ignored and have been estimated for Clinton Power Station. A one year implementation schedule is an increase of 50% in manpower, while for a two year effort is an increase of 25% or more. Either time frame for implementation will be costly. To implement a program for compliance with the Proposed Revisions to 10CFR20 will be $1,865,000. The annual increase in costs to maintain compliance within the program will be $397,000 per year. Both values are expressed in 1989 dollars. The assessment describes the areas of the Proposed Revision and what parts need to be implemented. A few recommendations about planning are included. The Department procedures are identified with those sections of the regulations that may need to be revised. Appendix D of this assessment report details the basis for the implementation costs for each major cost area of the Proposed Revisions, with the separate entries for the increased cost to maintain the program in compliance.

AA3-2

THE IMPLICATIONS OF THE PROPOSED 10CFR20 CHANGES UPON THE RADIATION PROTECTION DEPARTMENT

INDEX

EXECUTIVE SUMMARY i

INDEX ii

INTRODUCTION 1

DISCUSSION 2

- The Proposed Revision 2
- Nomenclature 2
- Brief Overview of Impact 3
- The Scientific Bases 3
- Methodology in Brief 3

MAJOR CHANGES ARISING FROM THE REVISION OF 10CFR20 4

- Internal Dose Assessment 4
- Summation of Internal and External Exposures 4
- Occupational Dose Limits 5
- Limiting Dose to the Public 6
- Recordkeeping and Reporting Requirements 7

IMPACT FROM DOSE EVALUATION REQUIREMENTS 8

- External Dose 8
- Internal Dose 9
  - Bioassay Monitoring 10
  - Air Monitoring 10
- Dose Evaluation Impact 11
- Recordkeeping and Dose Evaluations 12

A138-2

IMPACT OF THE REVISED EXPOSURE LIMITS 13

Impact of Occupational Dose Limits for Adults 13

Planned Special Exposures 14

Dose to the Embryo/Fetus 15

Dose Limit for Individual Members of the Public 15

IMPACT OF OTHER CHANGES 16

Internal Exposure Controls 16

Precautionary Procedures 16

Waste Disposal 16

General Recordkeeping Requirements 17

Reporting Requirements 18

Summary of Other Changes 18

SECONDARY IMPACT EVALUATIONS 19

Training and Retraining 19

Procedure Revisions 19

USFULNESS OF CURRENT TECHNOLOGY AFTER THE REVISION 20

CONCLUSIONS 21

APPENDICES INDEX 23

Appendix A Current and Proposed 10CFR20 Sections 24

Appendix B Terms and Definitions for Dose 34

Appendix C Procedure Impact Matrix 36

Appendix D Estimates of Implementing and Maintenance Costs 48

AA38-2

SIGNIFICANT IMPLICATIONS OF THE PROPOSED 10CFR20 CHANGES UPON THE RADIATION PROTECTION DEPARTMENT

1. INTRODUCTION

The International Commission on Radiation Protection (ICRP) set forth recommendations regarding radiation protection standards in the ICRP Publications 26, 30, and 32. These International Standards have been published for 8 to 12 years. Included are standards which, many in the profession of radiation protection feel, should be applied internationally, including in the United States. This contributed in part to the proposed changes to the Title 10, Code of Federal Regulations, Part 20 (10CFR20). The changes were envisioned as making the nearly thirty year old U.S. regulations more closely unified with standards accepted in the international community. Additionally it would provide the opportunity to clarify some of the current regulation's ambiguities. And some data used in the current regulations have more recent determinations that could be incorporated during the course of the revision to improve on accuracy. The revision cleaned up areas where requirements were stated in documents other than 10 CFR 20, such as ALARA in Regulatory Guides 8.8, 8.10, and 8.19, and respiratory protection as described in the current Appendix A footnotes, Regulatory Guide 8.15 and NUREG 0041. The current proposed date of issue is January 1, 1991.

To provide for better planning for the Proposed 10CFR20 changes an assessment was performed. The results would be used as a tool in the planning process for their implementation. Existing and proposed 10CFR20 regulations were compared. The significant differences were determined. The assessment was made of the impact upon the programmatics of the Radiation Protection Department. A thorough understanding and proper use of the data is necessary for effective planning and scheduling. An estimate was made of the additional resources necessary to meet that schedule. Having developed a preliminary planning estimate, timely requests for the additional budgetary support can be submitted. The integration of the process will contribute to a smooth and orderly transition into compliance with the proposed changes as they are issued as the official version of the regulations.

It appears that activities associated with implementation of the revised regulations will, for the duration, significantly increase technical and administrative workloads. This will necessitate that additional resources are made available to achieve compliance. While the levels of continuing support

AA38-2

will not be as high as the implementation costs, increases in the annual operating costs of approximately 15%-25% of the implementation costs will be necessary to maintain compliance.

The scope of the assessment was to identify Significant changes in the Radiation Protection Procedures and program changes caused by the implementation of the proposed 10CFR20. The assessment was not designed to be an exhaustive analysis for which detailed human resource allocations and dollar expenditures were to be determined. These will need further evaluation as the implementation date is firmly established. Part of the assessment necessarily reflected on resources from an overall perspective and established approximate values.

DISCUSSION

THE PROPOSED REVISION

The U.S. intent to achieve international uniformity is commendable. The regulations have long needed serious revision to consolidate related information, correct errors and address better data from the scientific community. On this basis the revisions in those specific areas are welcome.

The Proposed Revision introduces changes in methods of assessing exposure, when to start that assessment, terminology, and changes limits of exposure for various organs with both increases and decreases. With these changes comes the imposition of very costly system modifications which are an attempt to prevent hypothetical over-exposures which could arise from not summing an individuals external and internal exposures. These changes will handle data relevant for only about 1% of the workers. Such changes have not been justified in a clear manner to the power reactor licensees.

NOMENCLATURE

There have been major changes in the numbering of sections of 10CFR20. The present version is numbered from 20.1 to 20.8 in the General Provisions section as is the Revised version. The major changes are from 20.101 to the end. In the current 10CFR20, sections are numbered from 20.101 to 20.601, and four Appendices, one a reserve. The Proposed Revision is numbered from 20.101 to 20.1401, with six Appendices, one of which is a reserve. While an identical formatting system was used, no sections from 20.101 to the end, cover identical subjects under identical numbering.

The Current and Proposed Revision of 10CFR20 are annotated and outlined as parallel columns in Appendix A of this report.

AA38-2

BRIEF OVERVIEW OF IMPACT

Cost-benefit analysis of the costs that will be borne by the licensees to comply, and the benefits that they or their workers will realize, does not support a valid basis for implementation of the proposed regulations. The regulations will impose extensive and costly changes in licensee programs: capital equipment, procedure revisions, training, additional staffing, software revisions [including the re-verification and re-validation of electronic media legal records], and personnel exposure monitoring changes. Meanwhile, there is no evidence that it will produce an increase in safety or reduction in exposure (and may, in fact, work oppositely). Compliance with the proposed regulations will not be achievable without the expenditure of significant initial economic and human resources by most nuclear utility licensees. Additionally, there will be a net increase in operating costs to maintain compliance after implementation is complete.

THE SCIENTIFIC BASES (or lack thereof)

The Proposed Revision to 10CFR20, and the limitations imposed for reducing exposure, is that data from U.S. Nuclear Power Plant facilities indicates that:

The average exposure at these facilities is trending downward.

Highest exposures are trending downward.

The number of internal depositions are trending downward.

The number of exposures above one rem/year are trending downward.

There is still no statistically significant difference from these workers and the surrounding populations regarding mortality or morbidity.

There is no strong scientific evidence for the revision.

METHODOLOGY IN BRIEF

The assessment was conducted after the development of a matrix of the Existing and the Proposed 10CFR20 requirements. A mid-project test was performed. The initial matrix was used to identify the differences between the two versions of the regulations. Subsequently, Radiation Protection Department Procedures were matrixed against both versions of the 10CFR20 requirements.

AA38-2

The original intent of the matrices was to incorporate computer based search routines. These would provide the contractor with the appropriate tools for a rapid, and fairly accurate impact assessment. Subsequently, the concept was expanded to consider providing that tool to the Radiation Protection Department for continued use. During a Mid-Project Test Demonstration, the interim results clearly showed that there are limitations. The major limitation occurs when the search routine is used with special case documentation, i.e., USAR, 10CFR20 (especially comparing present with proposed versions), Technical Specifications, Procedures. These regulations were written by different or multiple authors. Each author uses a slightly different style and language. Performing a text search requires an individual to have a very detailed knowledge of the subtle differences in phrasing of these documents. Common terminology used in these texts are not used as generic phrases. Therefore, many technical phrases of the same subject are not stated identically. This complicates a computer based search for phrases which, in print, may be identical in meaning without being identical in phrase between documents or in sections written by others. This requires an individual to make judgments regarding phrase structure for searches. Several searches may have to be made to cover a single technical meaning.

2. MAJOR CHANGES ARISING FROM REVISION TO 10CFR20

2.1 INTERNAL DOSE ASSESSMENT

The proposed 10CFR20, in addressing changes in the ICRP determination of relative risk, and as adopted by the USEPA, requires the summation of both external and internal exposures. It is now referred to as the total dose equivalent, inferring a measure of total health risk to individuals.

The summation requirement might result in increased whole-body dose equivalents being recorded (compared to whole-body doses currently being recorded) even though the actual dose (risk) to the worker remains the same. Because this increase in recorded dose would be a result of changing terminology rather than an actual increase to risk, no impact regarding health effects is associated with this change. Additional records may be generated.

2.1.1 SUMMATION OF EXTERNAL AND INTERNAL EXPOSURES

Proposed Revision 20.202 provides the details as to how a licensee considers intakes of radionuclides for the determination of total effective dose equivalent.

AA38-2

Proposed revision 20.204 defines acceptable procedures for determining internal exposures based upon bioassay or air sampling measurements.

The current 10CFR20 does not require summation, and uses different terminology for expression of exposure and dose from internal exposures. Regulatory Guidance is currently used for the description of acceptable models for calculating internal exposure and organ doses. 25% of Quarterly limits is the current monitoring limit, with concerns to daily and weekly thresholds for tracking MPCs, MPC-hrs.

Proposed Revision 20.502 requires monitoring when it is likely that an individual will receive in excess of 10% of the occupational limits. The section mandates that suitable measurements be performed, in accordance with 20.202, to allow summation of internal and external doses. Summation is required when internal doses exceed the applicable annual limits by 10%. MPC, MPC-hr have been replaced by ALI (Annual Limits on Intake) DAC and DAC-hr (Derived Air Concentration). This will be a major area of impact on Procedure revision, retraining of operational radiation protection technicians, counting room personnel (RP and/or Chemistry), and Supervisory staff responsible for the review, evaluation, and assessment of airborne conditions.

2.2 Occupational Dose Limits

Proposed 20.201 addresses the Occupational Dose Limits for Adults. The definition of "whole-body" has been re-defined. There is no longer a specified quarterly limit. The annual limits are: Total Effective Dose Equivalent of 5 Rem whole body, and 50 Rem (the sum of deep and committed dose equivalents) for organs or tissues other than the lens of the eye, which is 15 Rem eye dose equivalent.

The Current version allows 1.25 Rem/qtr whole body and lens of the eye, or head and trunk, or active blood forming organs, or gonads, 7.5 Rem/qtr to skin, and 18.75 Rem/qtr to each of the extremities. With a history on file, the worker could receive up to 3 Rem/qtr up to 5(Present age in years-18) Rem.

The current 10CFR20 specifies limits of exposure to airborne radioactive material. The limit is based upon the current Appendix B. Continuous exposure to air concentrations stated for occupational MPC would produce the equivalent of 2.5 mrem/hr, or 5 Rem/year.

The Proposed Revision does not specify limits, as such. The limit is the difference of the Total Effective Dose Equivalent and the External Dose/Deep Dose Equivalent. The sum of which is limited to 5 Rem/year. Soluble Uranium intake is limited

to 10 mg/wk for reasons of chemical toxicity.

It should be noted that for most utilities, tracking of exposures for external and internal has not been implemented with summation as a requirement. If for whatever reason, a utility was inclined to operate near the upper ranges of the limits for both internal and external exposure, the system for tracking these exposures for each individual worker will be extensive and expensive. Utilities may set administrative limits to reduce the likelihood of overexposure. They may employ respiratory protection to take advantage of the protection factors. This action may prompt subtle regulatory pressure based on inadequate ALARA evaluations. The Proposed regulations state that respirators are only to be used when engineering measures are not practical. If respirators are used, sophisticated tracking system may be "required" or at least "available for use" at each site not fully considering ALARA practices.

Planned Special Exposures are in Proposed section 20.206. This is a method for licensees to authorize adult workers to receives doses in excess of occupational dose limits, and the conditions which must be met prior to these authorizations. Limitations are that the worker could receive double the annual limit for a maximum of 5 times during the worker's lifetime.

The Planned Special Exposure is similar to the Current regulations permitting the 5(N-18) rule exposures above 5 Rem/year.

Dose to an Embryo/Fetus is new in Proposed 20.208. The new rule limits the Total Effective Dose Equivalent of a declared pregnant woman to 0.5 Rem during the pregnancy.

Limiting exposure of pregnant women is not required by the current regulations and is considered voluntary. Guidance is found in Reg. Guide 8.13 (1987), and a Staff Position Paper.

2.3 Limiting Dose to the Public

Present 10CFR20 implies public exposure limits of 0.5 Rem/year whole body. 10CFR50 Appendix I, recommends external whole body, beta and iodine limits.

Proposed Revision specifies in 20.301, limits of the Total Effective Dose Equivalent to individual members of the public to 0.1 Rem/year from all operations by a licensee excluding disposal of radioactive material into sanitary sewerage. There is an allowance for applying to operate up to an annual Effective Dose Equivalent of 0.5 Rem/year for individual members of the public.

AA38-2

Proposed Revision section 20.302, requires licensees to make measurements, as required, to demonstrate compliance with the limits specified in section 20.301.

2.4 Recordkeeping and Reporting Requirements

The current 10CFR20 recordkeeping and reporting requirements addressed in 20.401-20.409, are relatively straight forward by present standards. Many recorded values are direct transcriptions from survey reports, dosimetry reports and incident reports filed in handwriting by operational RP staff. Terminology is relatively straight forward. This permits practical usage of clerical staff for handing the collection of report data from files, and a reasonable chance for attentive clerks to catch errors in both records and reports.

The Proposed Revision section on records is 20.1101-20.1110. There are increased numbers and types of required records. While many of these may have been retained in one form or another, the Proposed revision now requires the following records types: Radiation protection programs; surveys; determinations of prior occupational dose; planned special exposures; individual monitoring results (internal and external); dose to individual members of the public (formerly just in the REMP and Semi-annual effluent reports); waste disposal; testing of entry control devices for very high radiation areas.

Proposed Revision section 20.1106, individual monitoring results, and supporting information, are the subject of a major report by the Atomic Industrial Forum in NESP-030 (75 pages), Dosimetry and Recordkeeping Implications of the Proposed Revisions to 10 CFR 20. The quantity of records is expected to increase with the Proposed Revisions, from 10% - 20%, after the initial period of implementation. The Battelle-Pacific Northwest Laboratories Report, PNL-6712, classify the changes as minor. This assessment of impact agrees more with the NESP-030 Report, that the impact is significant, especially in the dosimetry and recordkeeping requirements.

Considerably more information is required to be accumulated and recorded to demonstrate compliance with the occupational dose limits and the prior exposure history. Records that are able to demonstrate compliance with the dose limits to members of the public are recently added to these regulations. Parts of these were found in the RG-1.21 Report and the REMP report. This is found in the Proposed Revision 20.1107.

Proposed Revision section 20.1206 requires that annual individual monitoring reports be issue to every individual for whom monitoring is required. This is in addition to the 10CFR19 requirement for the annual statistical report. The current 10CFR20 requires that a report be issued to individuals upon request, or upon termination. Reports to the NRC are required for all Planned Special Exposures.

3.0 IMPACT FROM DOSE EVALUATION REQUIREMENTS

The Proposed Revision has somewhat redefined "whole-body" and revised the limits of exposure to everything else. There is no longer a quarterly exposure limit. The use of 5(N-18) is no longer a choice for extending exposures beyond 5 Rem. Monitoring of internal or external exposure is proposed to be started at the 10% instead of 25% of MPE.

Internal and external exposures are now to be added to describe total exposure. Internal exposure is no longer an evaluation with the simple calculations based upon MPC-hrs.

Two limits were increased, eyes from 5 Rem/year to 15, and skin from 30 to 50 rem/year.

There are major changes on the nomenclature for airborne from the current MPCs and MPC-hr units. The Proposed units are Annual Limits on Intake (ALIs), and Derived Air Concentrations (DACs) and Derived Air Concentration - Hours (DAC-hrs).

3.1 External Dose

The present 10CFR20 limits external whole body doses to 3 Rem/quarter, with a lifetime average of less than 5 Rem/year after the age of 18. Doses to individual organs are not considered in the calculations for compliance with this limit.

The Proposed Revision has a 5 Rem per year limit including the summation of external and internal doses when the internal exceed 10% of the annual effective dose equivalent limit.

The proposed dose limits may impact personnel dosimeter physical configurations. The deep dose equivalent is measured below 1000 mg/cm^2. The eye dose equivalent is measured beneath 300 mg/cm^2. Skin dose is measured at a depth of 0.007 cm (7 mg/cm^2). For the licensee to meet these requirements, the minimum deep dose sensitivity to meet the 10% MPE is 40 mrem/month. To accurately state a measurement to be 40 mrem, the sensitivity must be lower than that to provide statistically significant values after the background is subtracted. This means that the detection medium in the dosimeter must be sufficiently sized for the worst case under the filters to meet these limitations.

Many of the values obtained from the personnel dosimeters in present systems do not fully support the data that will be required to define the three major parameters above. Where there is no in-house dosimetry system, the vendor based system should meet the specification. Bid specifications for contracted services can have the service started on the appropriate date. Double service for three to six months will provide crossover data between the two dosimeter types.

A full evaluation of the dosimetry computer database will be required in order to provide tracking of the two separate sets of dosimeter holders. This is a requirement for accumulating data between the two holder systems and the methods of interpretation of dose. Software that is written to select the appropriate data presentations according to the date of change-over between the two systems is necessary if raw data is also stored in the database. This is important to recognize and acknowledge in the bid specification as it pertains to the vendors storage of your raw dosimetry data during the crossover between dosimetry holder systems.

Entry of data into the Station's computer database from written data input sheets or standard survey forms will require some degree of retraining. Additionally, the procedures from which these data sheets originate may require slight to major revision in order to have the dosimetric terminology stated correctly before input.

These are considered to be areas in which there will be significant change in procedures, forms, retraining and increased workload because of the Proposed Revision.

3.2 Internal Dose

The current 10CFR20 Section 103 (20.103) specifies the limits for exposure to concentrations of radioactive materials in air in restricted areas. Internal dose is a function of the concentration in air (MPC) and the duration of exposure (MPC-hr). The unit values of MPC were established using empirically derives biokinetic models and the calculated dose to critical organs based upon inhalation. The critical organs were specific for each radionuclide.

Compliance with the current regulations compares the present exposure with the time average concentration for 2 hours/day, 10 hours/week, or 520 hours/quarter. At a level of 25% of MPC-hr values for a comparable time period, monitoring of intake is required to be tracked.

The Proposed Revision is based on an annualized average, and is referred to as the Annual Limit on Intake (ALI). This is

also based upon intake by inhalation of derived air concentration (DAC). Monitoring of intakes is required if an adult is likely to receive in one year, 10% of the applicable Annual Limit on Intake (0.1 X 2000 DAC-hr).

The Proposed Revision indicates that compliance can be demonstrated in any of three ways. 1). Limit the sum of the quotients of the intakes divided by the ALIs to unity. 2). Limit the DAC-hrs of exposure to 2000. 3). Using data from successive bioassays, project the time for the annual limit to be reached based upon the committed effective dose equivalents to all organs and tissues for ongoing ambient exposures.

There are several changes in the DAC limits when compared to the current MPC limits. Some have been increased, and there are reductions in others. These may be either by radionuclide in all forms, or, as in the case of Cobalt-60, changes in only one of the forms (soluble/insoluble).

Just as in the current regulations, bioassay with calculations of the committed effective dose equivalents, and measurements of airborne concentrations to establish exposure conditions are also acceptable exposure determining methodology.

3.2.1 Bioassay Monitoring

The current 10CFR20 describes 25% MPC as the level to begin monitoring, usually referring to 520 MPC-hrs.

Proposed Revision refers to monitoring being required at 10% of an ALI.

Using the current and proposed exposure monitoring limits, and comparing them to the data of Draft ANSI Standard N13.30, Performance Criteria for Radiobioassay, most of the required limits are measurable. This is valid using a 30 day bioassay frequency, and the appropriate "in vitro" or "in vivo" bioassay techniques, which depend upon the isotope being monitored. This should be the subject of a detailed technical review. The determinations should establish the system sensitivity for "in vivo" and "in vitro" detection, frequency of the bioassay that would improve sensitivity if required, and other methods for improving sensitivity if cost permits. Alternatives, such as improving the air monitoring methodology, should not be over looked.

3.2.2 Air Monitoring

Air monitoring to collect and analyze work zone air samples, is a recognized method for assessing possible intakes by workers. Sampling flow rates provide a variable which can

become the limiting factors for achieving acceptable MDAs.

Both the current and the Proposed regulations require a thorough understanding of the dynamics of air sampling and analysis. From that, detailed and meaningful assessments of airborne radioactive material can be calculated. The subsequent biokinetics of ingested radionuclides is then applicable for determining the committed dose equivalent.

3.3 Dose Evaluation Impact

Changes in the dose evaluation requirements are not expected to affect doses received by the public. Neither should it impact the frequency of accidents that impact occupational or public exposures, or cause property damage.

There will be major program and procedural revisions to change over to the Proposed terminology, levels for required monitoring, external dosimetric measurements of deep and eye and skin exposure, and the elimination of the 3 Rem/Quarter and 5(N-18) exposure limits. Revisions to the Airborne concentration levels will need retraining to prevent old habits from permitting overexposures. The computer database for all of the dosimetric information, methodology of performing dose calculations, especially for internal dose, and the new requirement for adding external and internal exposure, will require significant modification to existing systems. Training in the new terminology of ALIs and DAC and DAC-hrs, the difference in monitoring, reporting, and dosimetric determinations for the subtle differences in the terms, will be essential prior to the implementation of the Proposed Revisions.

There should be a serious effort by the Radiation Protection staff professionals to become familiar with the Proposed Revision when it is issued for rulemaking. This, with the mind toward practical administrative measures that are possible to implement to achieve the intent of the new regulations without having to expend major resources toward compliance aspects of the program that impact only fractions of a tenth of a percent of the workers. [Booth, Bronson and Groth 1985, "Less than 0.03% of the individuals monitored at nuclear power plants between 1978 and 1983 had measured body burdens in excess of 10% of the relevant ALIs".]

NOTE: There is a difference in the values stated in the assessments by the Atomic Industrial Forum (AIF) AIF/BNESP-030, Dosimetry and Recordkeeping Implications of the Proposed Revisions to 10CFR20, and Battelle Pacific Northwest Laboratory (B/PNL) PNL-6712, Regulatory Analysis for the Revision of 10 CFR

Part 20 regarding the cost of implementing the in the area of exposure evaluations. This assessment is in much closer agreement with the AIF assessment values.

Contrary to one of the stated purposes behind the Proposed Revisions being that of exposure reduction, no mechanism, nor new requirement was found that would produce those results for the nuclear power industry. In the end, the changes might produce increases in collective exposures.

3.4 Recordkeeping and Dose Evaluations

The current 10CFR20 has considerable recordkeeping requirements. While the regulations state many of the retention times for various records, American Nuclear Insurers (ANI/MAELU) prefer longer retention times in the event that there is litigation to contend with.

The Proposed Revision has comparable requirements as the current regulations. Additionally, with the new requirement of adding the external and internal exposures, the calculations of internal exposure from internal ingestions and organ weighting factors, records retained for each exposed employee will be greater than with the current requirements. Records of the evaluative process and calculations for the internal dosimetry programs will be necessary, including extensive modifications to the evaluative procedures. Records associated with NRC Form 5 will also increase. Information that is transmitted when supplying exposure history will increase.

Extensive revisions in the dosimetry recordkeeping will be required. Procedures will require revision. Training in the new requirements will be necessary. These modifications must be extended into contracts with dosimetry services companies to assure compliance with the Proposed Revisions.

The requirement for summation of external and internal exposures has the potential for major recordkeeping and handling workloads increases. A system for tracking the exposures below the 10% monitoring or summation requirement is necessary, in the event that the worker exceeds the 10% limit prior to the end of the year. Hence the active records access is 100% for all workers who have the potential for exposures, external or internal or both, of 10% of the annual limits. Without the tracking, there may not be other evidence that compliance with the regulations was achieved.

Cost for implementing these requirements has been estimated from 20-40% of the total cost of implementing the Proposed Revisions. For a single unit nuclear utility in 1989 dollars,

the estimate is $900,000 for the dosimetry and recordkeeping of those program elements. This value is somewhat higher than the AIF/NESP-030 Report, however, other cost items that were not identified by that report are included in this assessment.

Cost for maintaining the required level of compliance is estimated to be $180,000.00.

No attempt was made to quantify doses expended or dose saved by these requirements. There is disagreement regarding the costs and benefits in the reports of others and this work.

4.0 Impact of the Revised Exposure Limits

Section 3.0 above described the changes from the current to the Proposed Revision of the revised exposure limits. In addition, the Proposed Revision now specifies limits for the embryo/fetus and for individual members of the public.

4.1 Impact of the Occupational Dose Limits for Adults

In both the current and the Proposed Revisions the annual limit is 5 Rem. The Proposed Revision refers to it as total effective dose equivalent. This is an administratively determined dose. One does not measure "Total Effective Dose Equivalency". It is the sum of calculations for Dose equivalent, deep dose equivalent and the effective dose equivalent. These are calculated from measurements of personnel dosimeter values beneath 1000 mg/cm^2, evaluations of that exposure to calculate the organ irradiation dose using the weighting factors, and data from the bioassay results which are evaluated against biokinetic models after exposure duration and recompartmentalization is accounted for. While the 16 new terms may have relevance to research radiobiologists, radiation litigation legal staff and radiodosimetry statisticians, these are not the terms that are practical for use in the field. Their need for use in the nuclear power industry will be infrequent. By deduction, data for the nuclear power industry has been showing a downward trend in levels of exposure over the last four years. And as mentioned, only 0.03%, or sixty workers per year will exceed 10% of an ALI that will require the summation of external and internal exposures. With such infrequent occasion to generate data that use the administrative dose terms, careful attention to detail will be necessary to minimize use of incorrect terms.

[See Appendix B for the 16 different definitions of dose used in the Proposed Revisions]

The eye dose equivalent was increased to 15 Rem/year as measured beneath a 300 mg/cm^2 absorber thickness. For this

data the most reliable source of data will be an appropriately fabricated dosimeter. This increase is not supported by evidence for its increase. Work by the U.C. Berkeley Donner Laboratory found that for mixed radiations including possible charged particles, radiation cataract thresholds occurred at 235 Rad. In a literature search and report by Kephart, G., that for pure charged particles, lens opacity could occur from acute exposure in the tens of Rad, out to hundreds of Rem for gamma radiation. The new limit allows for a lifetime eye dose of 750 Rem. This may all be rather academic, in that most power reactor employees that are working where eye dose may a factor, are instructed to wear eye protection. This reduces the exposure to beta radiation associated with the tasks.

The elimination of the 3 Rem/Qtr was not accompanied by a requirement to distribute the 5 Rem/yr evenly over a year. There are alternatives for dealing with this in the licensee's program. Establish administrative limits (weekly, monthly, etc.,) that maintain exposures such that there are no premature accumulations of external and internal exposures that could add up to 5 Rem. Provide active ALARA job planning to distribute exposure to limit total exposures to each worker. If the licensee does not take active and positive steps, employee organizations, bargaining units or labor unions will likely step forward and force the issue to keep people from being laid off due to exposure limits. Tracking these administrative limits and ALARA job planning will cause increases in staffing in those areas. Outage planning will likely hire 20 extra workers to use to distribute exposure. This will decrease the possibility of exceeding administrative limits. Unfortunately, it will also decrease the efficiency of the job by the increased turn-overs, and thereby increase the collective exposure for the job.

It should be noted that since 1986, collective exposures have reached an industry low, and no worker received greater than 5 Rem while working at one facility. Subsequent years data indicate that the trend is ongoing in the downward direction where it might reach a threshold in 1990 or 1991. This may see another downward trend as utilities incorporate more automated equipment and robotics for high exposure tasks.

4.2 Planned Special Exposures

The planned special exposure is a measure that is to be used only when no other reasonable alternative exists. Cost effectiveness is not in the wording of the Proposed Revisions, while unavailable or impractical are operative terms. The amount of paperwork, recordkeeping and approval process make this much more difficult to use than the former 5(N-18) provision from the current regulations. Complexities of the

use of the Planned Special Exposures provision, and the present trending of downward doses will make this a little used but necessary section.

4.3 Dose to the Embryo/Fetus

There are no provisions in the current regulations for limiting exposure to the unborn. The Proposed Revision is explicit within the regulations that the pregnant worker shall be limited to 0.5 Rem for the entire pregnancy, and that substantial variation above a uniform rate should be avoided. Most licensees have invoked the Reg Guide 8.13 guidance as administrative limits and will not find this to be a major impact.

4.4 Dose Limit For Individual Members of the Public

The dose limit for individual members of the public is not explicit in the current 10CFR20. There are approximations of 2 mrem in any hour and 100 mrem in any 7 consecutive days based upon continuous occupancy of an individual in an unrestricted area. There is an implied limit of 500 mrem per year. This is a matter addressed in 40CFR190, and to some extent, 10CFR50, Appendix I.

The Proposed Revision explicitly states an annual dose limit of 0.1 Rem to individual members of the public from continuing operations by a licensee.

Based upon present operations, this should be easily achievable. The only major complication would be a major gaseous or liquid release. The airborne activities would be dispersed and somewhat easier to recover from. A major release to the lake would impact the public using the waterway for recreation or sportfishing.

There are no provisions for tracking members of the public that may frequently visit numerous nuclear facilities in one year. Visitor doses are already kept low, and therefore should not present increases in costs beyond dosimetry and recordkeeping. Administrative controls can easily restrict access to any radiologically controlled , contaminated or airborne radiation area. In so doing, limiting exposures to visitors is not an impact different from current practices.

AA38-2

5.0 Impact of Other Changes

5.1 Internal Exposure Controls

Occupational internal exposure control has changed in the Proposed Revision. The current regulations require licensees to maintain intakes of radioactive material as low as is reasonably achievable. This is without apparent regard for the external exposures. Therefore respiratory protection is often used to achieve this. The use of respirators may not be in the best interest for the reduction of external dose if the inefficiency from wearing them significantly increases the time for job performance.

The Proposed Revision now includes the internal exposure as part of the total exposure. This may present opportunities to make ALARA exposure decisions to discontinue use of respirators to increase work efficiency. Data for either practice is sketchy and needs further evaluation prior to making any recommendations. The trade-offs of greater efficiency but having to do increased air monitoring and airborne activity determinations, along with the DAC-hr accounting, might reduce exposure but greatly increase support costs.

5.2 Precautionary Procedures

Labeling requirements have changed only slightly. Only 24 of the 581 listed radionuclides are more restrictive. The remainder are equal or greater than the current 10CFR20 requirements.

Posting requirements are essentially equal for the current and Proposed Revision 10 CFR 20.

Package handling requirements have not been changed significantly from the current to the Proposed Revision of 10CFR20.

5.3 Waste Disposal

The Proposed Revision explicitly permits on-site storage of radioactive material to allow for decay. The current 10CFR20 does not have this as a regulatory item. On site storage was permitted after 1981 when NRC issued a generic guidance letter for temporary radwaste storage at nuclear power plants.

The Proposed Revision significantly reduces the concentrations that can be released to sewerage for disposal. This will not impact nuclear utilities that comply with 10CFR50 Appendix I.

AA38-2

5.4 General Recordkeeping Requirements

Individual monitoring results, required by the Proposed Revision, are clearly a significant change over the current 10CFR20 requirements. The increase in the amounts of materials will vary widely depending upon the characteristics of the exposure. All of the records have to be filed for each exposed individual prior to the evaluation or calculation of that individual's exposure. The handling of the records must be timely and accurate An assessment of the complexity of the records system will depend upon the design of the system, to what extent it can be computerized, and the number of workers that require more than just the basic exposure tracking to be performed.

Records of Surveys required by the Proposed Revision state more detail as being required than the current 10CFR20. While the impact on recordkeeping may not increase significantly, the procedure revision to address the amount of detail, and the forms upon which the data is recorded, will require considerable revision.

Determination of Prior Occupational Dose has been modified in the Proposed Revision. The current version permits up to 100 mrem/week occupational exposure until prior exposure histories are compiled, and the 5(N-18) rule can be used. The Proposed Revision requires that licensees must attempt to obtain lifetime records of dose before permitting individuals who require personnel monitoring devices to enter the controlled or restricted areas. In theory, this will increase the workload for any utility that does not now do NRC Form 4 histories on each worker issued a dosimeter. Awaiting the histories of contract workers, unless a system such as INDEX is used by all other utilities, where that data is immediately available for employees and transient workers, will potentially incur much lost time during the data accumulation. One possible solution is to accept documentation issued by previous employers to the worker as they exit a job site. Another is for prime contractors to supply the appropriate information for making an exposure history inquiry for each worker that will be reporting on site.

Planned Special Exposures will be so infrequently used that the recordkeeping requirements are expected to be insignificant.

Dose to Individual Members of the Public is an area where nuclear power plants are already operating Radiological Environmental Monitoring Programs. Data from these efforts, as well as the programs which are operated to demonstrate compliance with Reg. Guide 1.21, should amply demonstrate the requirements of the Proposed Revision.

AA38-2

Waste Disposal records should require only minor modifications to satisfy the proposed requirements.

Testing of Entry Control Devices for Very High Radiation Areas is usually recorded in a legal type record for potential litigation situations. No significant impact is expected for this new requirement.

5.5 Reporting Requirements

The current and Proposed Revisions to 10CFR20 have similar reporting requirements. The Proposed Revision has three significant changes.

Planned Special Exposures must be reported to the NRC within thirty days after the exposure occurs.

Separate reports for each individual for whom monitoring was required will be submitted to the NRC annually. This replaces the current annual statistical (20.104) report.

Reports of doses received in the workplace to all individuals for whom monitoring was required. (A requirement found in the revised 10CFR19, but which impacts the reporting program significantly).

5.6 Summary of Other Changes

Units of Radiation Dose will not require that reports be submitted or filed using the International System of units (SI).

Neutron Quality Factor will not require such detailed spectral knowledge that the Proposed Revision chart will be used. Instead, the NRC has indicated that it will continue to accept neutron dose assessment using the default Quality Factor of 10.

Radiation Protection Programs are required to be developed and documented, and that it is commensurate with the scope and extent of the licensed activities.

To the extent practicable, licensees procedures and controls will be adequate to maintain doses as low as is reasonably achievable.

None of the above differ from the existing operations, and with minor revisions to upper tier documents, are largely in place at this time.

AA38-2

6.0 Secondary Impact Evaluations

6.1 Training and Retraining. Significant costs will be incurred in training most of the plant employees in the General Employee Training. Areas in which technically trained staff are required to know and understand the regulations, more extensive training/retraining will incur greater costs. There will be costs in the research and development of these training programs, including the training aids, scheduling and lost time from an already established routine for training departments in mature and stable operating plants. After the initial intensive training has been conducted for essential staff following the issuance of the Proposed Revision as final rule making, the routine retraining of less essential personnel can be normal cycle of their training.

The Pacific Northwest Laboratories value assessment summary, indicated that no costs for training health physicist should be necessary. They felt that, as part of their job, they should already have an excellent understanding of such things as the Proposed Revisions of 10 CFR 20. Power plant health physicists are kept occupied with the routine, non-routine and immediate health physics duties. Therefore, training in the changes caused by revising 10CFR20, is and will continue to be a necessity for health physicists and radiation protection technicians in nuclear power plants that have less than 10% time devoted to training. (PNL does allow that others have determined that there will be significant training in all areas of the plant impacted by 10CFR20.)

6.2 Procedure Revisions

Very significant costs will be incurred to incorporate the revised requirements into Policies, procedures, manuals and training documents. Where new requirements have been issued, new program development will be necessary in that area, along with the implementing procedures. Extensive revisions were already mentioned for internal and external dosimetry. Appendix C Lists the Radiation Protection Procedures, and Proposed Revision section that impacts it. There are 214 procedures in the program area assesssed for impact. The following distributions of level of impact are:

DEGREE OF CHANGE	# of PROCS.	% of PROCS.
No Change	69	32
1-2 paragraphs	60	28
1-2 Pages	30	14
5-25% of document	23	11

AA38-2

25-50% of document	5	2
100% of the document*	6	3
5-50% now, major later*	21	10
New Procedures	15	N.A.

* = "Major" impact is usually associated with large scale revision of program performance or development of a new program element.

7.0 Usefulness of Current Technology After the Revision

The hardware presently in use for radiation protection surveys, spectroscopy, and analysis, will perform the intended function after 10CFR20 Revision is issued.

All software presently in use that performs evaluations of concentrations, depositions, internal dose estimates, organ burden estimates, external dose evaluations, will require extensive revision.

With the current instrument compliment without software revision, compliance is not possible. With software rewritten to incorporate the changes in values, terms, and dosimetric formulae, compliance will be achieved in these areas.

At present, Radiation Protection Professional Staff is (on the average) marginally knowledgeable of the current regulations. Continuous effort is required to maintain compliance under the current regulations. Individual effort is extreme for new entrants in the groups or the Department. Experienced staff are much more knowledgeable, and efficient at regulatory application.

There will be considerable effort to take the existing technology into compliance with the Proposed Revisions of 10 CFR 20. It will require extensive training, program redesign for existing programs, program development and implementation for newly required programs, major revisions to about 15% of the procedures, significant revision to about 50% of the procedures, major redevelopment throughout those programs with impact on dosimetry or input for dose evaluations for external and internal dose. Records will need considerable revision for the dosimetric parts of the radiation protection program. Major rewrite (programming) to the software of the department will be required to adapt to the new requirements. Tables for all values of concentrations for exposure, as well as concentrations that can be released, and those which require

labelling, must be installed in place of the current tables in the software.

The level of effort to provide upgrades, training, software rewrites, and those activities to achieve compliance with the Proposed Revision can be graded. High levels of efficient and effective effort can shorten the period of transition to compliance. However, the NRC is apparently prepared to provide an implementation period that will be one to two years. Effectively planned, contract support can be used to perform the current duties under the current regulations permitting the permanent staff to revise or write procedures, develop or redesign programs to meet the new requirements, rewrite software, and acquire training in the revised regulations. This utilization of permanent staff to provide the majority of the effort to make the changes to comply with revised 10CFR20 makes practical sense. When contractors provide such services, their departure creates a void in the knowledge of how, and what, and much of the history and bases for why one solution was chosen over another. When the new programmatics are in-place, and field tested, personnel trained in all the aspects of the operations, shift to the new 10CFR20 regulations, with appropriate notification to the NRC. When the operations are under control, release the supporting contractors.

8.0 CONCLUSIONS

The few studies that have been performed presume that permanent staff have adequate "free" time to be able to implement the necessary changes to comply with the Proposed Revisions given two or more years before compliance is required by the NRC. The presumption is that there is an adequate level of professional expertise and experience with all of the program elements that there is no need to hire contractors to support the effort.

The major areas of impact by the Proposed Revision have been evaluated using industry average labor costs including benefits, and making an attempt to include costs not always recognized by the two major groups that published the earlier assessments. For instance, no previous work addresses the need for and cost of revising the various computer software that supports many of these programs. Nor have the procedure revisions previously addressed the costs from the effort that is required in the approval cycle, printing and distribution costs. This assessment has profitted from the groundwork laid by others and has refined the costs of these. Additionally, the PNL costs have subtracted dollars per man-rem saved. This may be in an attempt to justify the very high costs that have very little benefit for the implementation of the Proposed Revision.

AA38-2

The summary estimates of cost for this utility to implement the Proposed Revisions to 10CFR20 are in Appendix D. The Total for the implementation costs in 1989 dollars is $1,865,000. The Total for the annual increase in operational expenditures for the program to maintain compliance with the Proposed Revision is estimated to be an additional $397,000. Neither value includes any amount for contractor support. Recommendations for effective use of contractor support is discussed in Section 7.0. The single greatest impact in dollars will be the new and complex requirement for the summation of internal and external dose. This feature should not be developed until the Proposed Revision is issued, and no other changes in the regulations will be made. Then, if NRC can be persuaded to accept alternatives, programs can be designed that are more efficient, and are not invoked unless the 10% of the limits are met. Currently, all discussions have presummed that all utilities will procede towards full, verbatim, compliance.

AA38-2

APPENDICES

A. Current and Proposed 10CFR20 Versions, Major Sections Are Annotated.

B. Terms Used to Characterize Dose or Exposure, with Definitions

C. Procedure Matrix with Current and Proposed 10CFR20

D. Cost Estimates For Implementing Proposed Revision 10CFR20, and Estimated Additional Cost to Maintain Compliance With Proposed 10CFR20

AA38-6

APPENDIX A

NEW 10CFR20 REQUIREMENTS		OLD 10CFR20 REQUIREMENTS
SUBPART A - GENERAL PROVISIONS		GENERAL PROVISIONS (Subparts not in old Part 20)
n20.1	PURPOSE	o20.1 PURPOSE
n20.2	SCOPE	o20.2 SCOPE
n20.3	DEFINITIONS	o20.3 DEFINITIONS
n20.4	UNITS OF RADIATION DOSE	o20.4 UNITS OF RADIATION DOSE
n20.5	UNITS OF RADIOACTIVITY	o20.5 UNITS OF RADIOACTIVITY
n20.6	INTERPRETATIONS	o20.6 INTERPRETATIONS
n20.7	COMMUNICATIONS	o20.7 COMMUNICATIONS
n20.8	REPORTING, RECORDING, AND APPLICATION REQUIREMENTS: OMB APPROVAL	o20.8 INFORMATION COLLECTION REQUIREMENTS:OMB APPROVAL
nSUBPART B -	RADIATION PROTECTION PROGRAMS (New Subpart)	PERMISSIBLE DOSES, LEVELS AND CONCENTRATIONS (Subparts not in old Part 20)
n20.101	RADIATION PROTECTION PROGRAMS (New subject matter for new Part 20. n20.101 is only section in Subpart B)	o20.101 RADIATION DOSE STANDARDS FOR INDIVIDUALS IN RESTRICTED AREAS (Now in n20.201, n20.202, n20.203, n20.204, n20.206, n20.207, n20.208)
n20.102	(Does not exist in New Part 20)	o20.102 DETERMINATION OF PRIOR DOSE (Now in n20.1104)
n20.103	(Does not exist in new Part 20)	o20.103 EXPOSURE OF INDIVIDUALS TO CONCENTRATIONS OF RADIOACTIVE MATERIALS IN AIR IN RESTRICTED AREAS (Now in n20.204, n20.701, n20.702, n20.703, n20.704)
n20.104	(Does not exist in new Part 20)	o20.104 EXPOSURE TO MINORS (Now in n20.207)

AA38-2

n20.105	(Does not exist in new Part 20)	o20.105 PERMISSIBLE LEVELS OF RADIATION IN UNRESTRICTED AREAS (Now in n20.301, n20.302)
n20.106	(Does not exist in new Part 20)	o20.106 RADIOACTIVITY IN EFFLUENTS IN UNRESTRICTED AREAS (Now in n20.301, n20.302)
n20.107	(Does not exist in new Part 20)	o20.107 MEDICAL DIAGNOSIS AND THERAPY (Not a specific section in the new Part 20)
n20.108	(Does not exist in new Part 20)	o20.108 ORDERS REQUIRING FURNISHING OF BIO-ASSAY SERVICES (Now in n20.204, n20.502)
SUBPART C - OCCUPATIONAL DOSE LIMITS		PRECAUTIONARY PROCEDURES (Subparts are new to Part 20.)
n20.201	OCCUPATIONAL DOSE LIMITS FOR ADULTS (Was in o20.101, o20.103)	o20.201 SURVEYS (Now in n20.501, n20.502, n20.1103)
n20.202	COMPLIANCE WITH REQUIREMENTS FOR SUMMATION OF EXTERNAL AND INTERNAL DOSES (New requirement)	o20.202 PERSONNEL MONITORING (Now in n20.502)
n20.203	DETERMINATION OF EXTERNAL DOSE FROM AIRBORNE RADIOACTIVE MATERIAL (Was in o20.103, o20.106)	o20.203 CAUTION SIGNS, LABELS, SIGNALS AND CONTROLS. (Now in n20.901-904)
n20.204	DETERMINATION OF INTERNAL EXPOSURE (Was in o20.103, o20.106, o20.108)	o20.204 EXCEPTIONS TO o20.203 (Now in n20.905)
n20.205	RESERVED	o20.205 PROCEDURES FOR PICKING UP, RECEIVING AND OPENING PACKAGES (Now in n20.906)

A-A58-2

n20.206 PLANNED SPECIAL EXPOSURES (Not a specific section in old Part 20)	o20.206 INSTRUCTION OF PERSONNEL (Now not a specific section in the new Part 20)
n20.207 OCCUPATIONAL DOSE LIMITS FOR MINORS (Was in o20.104)	o20.207 STORAGE AND CONTROL OF LICENSED MATERIALS IN UNRESTRICTED AREAS (Now in n20.802)
n20.208 DOSE TO EMBRYO / FETUS (New section and subject matter for Part 20. Previously covered only in Reg. Guide 8.13)	o20.208 (Does not exist in old Part 20)
SUBPART D - RADIATION DOSE LIMITS FOR INDIVIDUAL MEMBERS OF THE PUBLIC	WASTE DISPOSAL (Subparts are new to Part 20)
n20.301 DOSE LIMITS FOR INDIVIDUAL MEMBERS OF THE PUBLIC (Was generally found in o20.105, o20.106, 10CFR50 Appendix I)	o20.301 GENERAL REQUIREMENT (Now in n20.1001)
n20.302 COMPLIANCE WITH DOSE LIMITS FOR INDIVIDUAL MEMBERS OF THE PUBLIC (Was generally found in o20.105, o20.106, 10CFR50 Appendix I)	o20.302 METHOD FOR OBTAINING APPROVAL OF PROPOSED DISPOSAL PROCEDURES (Now n20.1002)
n20.303 (Does not exist in new Part 20)	o20.303 DISPOSAL BY RELEASE INTO SANITARY SEWERAGE SYSTEMS (Now in n20.1003)
n20.304 (Does not exist in new Part 20)	o20.304 DISPOSAL BY BURIAL IN SOIL (Removed from old Part 20, not reinstated in new Part 20)
n20.305 (Does not exist in new Part 20)	o20.305 TREATMENT OR DISPOSAL BY INCINERATION (Now in n20.1004)
n20.306 (Does not exist in new Part 20)	o20.306 DISPOSAL OF SPECIFIC WASTES (Now in n20.1005)
n20.307 >(Does not exist in new Part 20)	o20.307 (Deleted)

AA38-2

n20.308 >	o20.308 (Deleted)
n20.309 >	o20.309 (Deleted)
n20.310 >	o20.310 (Deleted)
n20.311 >	o20.311 TRANSFER FOR DISPOSAL AND MANIFESTS (Now in n20.1006)
SUBPART E - RESERVED	RECORD,REPORTS AND NOTIFICATIONS
n20.401 (Does not exist in new Part 20)	o20.401 RECORDS OF SURVEYS, RADIATION MONITORING AND DISPOSAL (Now in n20.1103, n20.1106, n20.1108)
n20.402 (Does not exist in new Part 20)	o20.402 REPORTS OF THEFT OR LOSS OF LICENSED MATERIAL (Now in n20.1201)
n20.403 (Does not exist in new Part 20)	o20.403 NOTIFICATIONS OF INCIDENTS (Now in n20.1202)
n20.404 (Does not exist in new Part 20)	o20.404 (Reserved)
n20.405 (Does not exist in new Part 20)	o20.405 REPORTS OF OVEREXPOSURES AND EXCESSIVE LEVELS AND CONCENTRATIONS (Now in n20.1203)
n20.406 (Does not exist in new Part 20)	o20.406 (Reserved)
n20.407 (Does not exist in new Part 20)	o20.407 PERSONNEL MONITORING REPORTS (Now in n20.1206)
n20.408 (Does not exist in new Part 20)	o20.408 REPORTS OF PERSONNEL MONITORING ON TERMINATION OF EMPLOYMENT OR WORK (Not a specific section in the new Part 20)
n20.409 (Does not exist in the new Part 20)	o20.409 NOTIFICATIONS AND REPORTS TO INDIVIDUALS (Now in n20.1205)

A438-2

SUBPART F - SURVEYS AND MONITORING	EXCEPTIONS AND ADDITIONAL REQUIREMENTS
n20.501 GENERAL (Was in o20.201)	o20.501 APPLICATIONS FOR EXEMPTIONS (Now in n20.1301)
n20.502 CONDITIONS REQUIRING THE INDIVIDUAL MONITORING OF EXTERNAL AND INTERNAL OCCUPATIONAL DOSE (was generally covered in o20.101, o20.103, o20.104)	o20.502 ADDITIONAL REQUIREMENTS (Now in n20.1302)
SUBPART G - CONTROL OF EXPOSURE FROM EXTERNAL SOURCES IN RESTRICTED AREAS	ENFORCEMENT (Now in Subpart O)
n20.601 CONTROL OF ACCESS TO HIGH RADIATION AREAS (Was generally covered in o20.203)	o20.601 VIOLATIONS (Now in n20.1401)
n20.602 CONTROL OF ACCESS TO VERY HIGH RADIATION AREAS (Was generally covered in o20.203)	o20.602 (Does not exist in old 10CFR20)
n20.603 CONTROL OF ACCESS TO VERY HIGH RADIATION AREAS - IRRADIATORS (Was very generally covered in o20.203)	o20.603 (Does not exist in old 10CFR20)
SUBPART H - RESPIRATORY PROTECTION AND CONTROLS TO RESTRICT INTERNAL EXPOSURE IN RESTRICTED AREAS	(There are no more text sections to the old Part 20. The next information is found in the Appendices)
n20.701 USE OF PROCESS OR OTHER ENGINEERING CONTROLS (Was found in NUREG 0041)	
n20.702 USE OF OTHER CONTROLS (Was in NUREG 0041)	

A-A38-2

n20.703 USE OF INDIVIDUAL RESPIRATORY PROTECTIVE EQUIPMENT
(was in NUREG 0041)

n20.704 FURTHER RESTRICTIONS ON THE USE OF RESPIRATORY PROTECTIVE EQUIPMENT
(Was in NUREG 0041)

SUBPART I - STORAGE AND CONTROL OF LICENSED MATERIAL

n20.801 SECURITY OF STORED MATERIAL
(Was in o20.203, o20.207)

n20.802 CONTROL OF MATERIAL NOT IN STORAGE
(Was in o20.207)

SUBPART J - PRECAUTIONARY PROCEDURES

n20.901 CAUTION SIGNS
(Was in o20.203)

n20.902 POSTING REQUIREMENTS
(Was in o20.203)

n20.903 EXCEPTIONS TO POSTING REQUIREMENTS
(Was in o20.204)

n20.904 LABELING CONTAINERS
(Was in o20.203)

n20.905 EXCEPTIONS TO LABELING CONTAINERS
(Was in o20.204)

n20.906 PROCEDURES FOR RECEIVING AND OPENING PACKAGES
(Was in o20.205)

SUBPART K - WASTE DISPOSAL

n20.1001 GENERAL REQUIREMENTS
(Was in o20.301)

AA38-2

n20.1002 METHOD FOR OBTAINING APPROVAL OF PROPOSED DISPOSAL PROCEDURES
(Was in o20.302)

n20.1003 DISPOSAL BY RELEASE INTO SANITARY SEWERAGE
(Was in o20.303)

n20.1004 TREATMENT OR DISPOSAL BY INCINERATION
(Was in o20.305)

n20.1005 DISPOSAL OF SPECIFIC WASTES
(Was in o20.306)

n20.1006 TRANSFER FOR DISPOSAL AND MANIFESTS
(Was in o20.311)

n20.1007 COMPLIANCE WITH ENVIRONMENTAL AND HEALTH PROTECTION REGULATIONS
(Not a specific section in old Part 20)

SUBPART L - RECORDS

n20.1101 GENERAL PROVISIONS
(Not a specific section in old Part 20)

n20.1102 RECORDS OF RADIATION PROTECTION PROGRAMS
(Not a specific section in old Part 20)

n20.1103 RECORDS OF SURVEYS
(Was in o20.401)

n20.1104 DETERMINATION OF PRIOR OCCUPATIONAL DOSE
(Was in o20.102)

n20.1105 RECORDS OF PLANNED SPECIAL EXPOSURES
(Not a specific section in old Part 20)

n20.1106 RECORDS OF INDIVIDUAL MONITORING RESULTS

AA38-2

(Was in o20.407)

n20.1107 RECORDS OF DOSE TO INDIVIDUAL MEMBERS OF THE PUBLIC
(Was in o20.106, 10CFR50 Appendix I, ODCM, Semi-Annual Radioactive Effluent Report)

n20.1108 RECORDS OF WASTE DISPOSAL
(Was in o20.401)

n20.1109 RECORDS OF TESTING ENTRY CONTROL DEVICES FOR VERY HIGH RADIATION AREAS
(Not a specific section in old Part 20. Covered as a surveillance at CPS)

n20.1110 FORM OF RECORDS
(Not a specific section in old Part 20)

SUBPART M - REPORTS

n20.1201 REPORTS OF THEFT OR LOSS OF LICENSED MATERIAL
(Was in o20.402)

n20.1202 NOTIFICATION OF INCIDENTS
(Was in o20.403)

n20.1203 REPORTS OF EXPOSURES, RADIATION LEVELS, AND CONCENTRATIONS OF RADIOACTIVE MATERIAL EXCEEDING THE LIMITS
(Was in o20.405)

n20.1204 REPORTS OF PLANNED SPECIAL EXPOSURES
(Does not exist in old Part 20)

AA38-2

n20.1205 [RESERVED]

n20.1206 REPORTS OF INDIVIDUAL MONITORING
(Was in o20.407)

SUBPART N - EXEMPTIONS AND ADDITIONAL REQUIREMENTS

n20.1301 APPLICATIONS FOR EXEMPTIONS
(Was in o20.501)

n20.1302 ADDITIONAL REQUIREMENTS
(Was in o20.502)

SUBPART O - ENFORCEMENT

n20.1401 VIOLATIONS
(Was in o20.601)

APPENDICES

nAPPENDIX A

PROTECTION FACTORS FOR RESPIRATORS
(Was in oAPPENDIX A)

oAPPENDIX A

PROTECTION FACTORS FOR RESPIRATORS
(Now in nAPPENDIX A)

nAPPENDIX B

ANNUAL LIMITS ON INTAKE (ALIs) AND DERIVED AIR CONCENTRATIONS (DACs) OF RADIONUCLIDES FOR OCCUPATIONAL EXPOSURE; CONCENTRATIONS IN AIR AND WATER EFFLUENTS, CONCENTRATIONS FOR RELEASE TO SEWERAGE
(Was in oAPPENDIX B)

oAPPENDIX B

CONCENTRATIONS IN AIR AND WATER ABOVE NATURAL BACKGROUND
(Now in nAPPENDIX B with new bases)

nAPPENDIX C

QUANTITIES OF LICENSED MATERIAL REQUIRING LABELING
(Does not exist in old Part 20)

oAPPENDIX C

(Does not exist in old Part 20)

AA38-2

nAPPENDIX D	oAPPENDIX D
UNITED STATES NUCLEAR REGULATORY COMMISSION REGIONAL OFFICES (Was in oAPPENDIX D)	(UNITED STATES NUCLEAR REGULATORY COMMISSION REGIONAL OFFICES,
nAPPENDIX E	oAPPENDIX E
[RESERVED]	(Does not exist in old Part 20)
nAPPENDIX F	oAPPENDIX F
REQUIREMENTS FOR LOW LEVEL WASTE TRANSFER FOR DISPOSAL AT LAND DISPOSAL FACILITIES AND MANIFESTS	(Does not exist in old Part 20. Content does exist in o20.311 for transfer for disposal and manifests.)

AA38-2

APPENDIX B

Terms Used to Characterize Dose or Exposure

1. Absorbed Dose- The energy imparted by ionizing radiation per unit mass of irradiated material.

2. Collective Dose- The sum of the individual doses received in a given period of time by a specified population from exposure to a specified radiation source.

3. Committed Dose Equivalent- ($H_{T,50}$), The dose equivalent to organs or tissues of reference (T) that will be received from the intake of radioactive material by an individual during the 50 year period following the intake.

4. Committed Effective Dose Equivalent- ($H_{E,50}=\sum_T w_T H_{T,50}$), the sum of the products of the weighting factors applicable to each of the body organs or tissues which are irradiated and the committed dose equivalent to the organs or tissues.

5. Deep Dose Equivalent- (H_d), which applies to external whole-body exposure, is the dose equivalent at a tissue depth of 1 cm (1000 mg/cm^2).

6. Dose (Radiation Dose)- A generic term which can mean absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, or total effective dose equivalent, as defined in other paragraphs in this section.

7. Dose Equivalent- (H_T), the product of the absorbed dose in tissue, quality factor, and all other necessary modifying factors at the location of interest, expressed in Rem or Sievert.

8. Effective Dose Equivalent- (H_E), the sum of the products of the dose equivalent to the organ or tissue (H_T) and the weighting factors (w_T) applicable to each of the body organs or tissues which are irradiated, ($H_E = \sum_T w_T H_T$).

9. External Dose- That portion of the dose equivalent received from radiation sources outside of the body.

10. Eye Dose Equivalent- The external exposure of the lens of the eye and is taken as the dose equivalent at a tissue depth of 0.3 cm (300 mg/cm^2).

11. Internal Dose- That portion of the dose equivalent received from radioactive material taken into the body.

AA38-2

12. Occupational Dose- The dose received by an individual in a restricted area or in the course of employment in which the individual's assigned duties involve exposure to radiation and to radioactive materials from licensed and unlicensed sources of radiation, whether in the possession of the licensee or other person. Occupational Dose does not include dose received from natural background, as a patient from medical practices, from voluntary participation in medical research programs, or as a member of the general public.

13. Planned Special Exposure- A planned, infrequent exposure, separate from and in addition to the annual dose limits.

14. Public Dose- The dose received by a member of the public from exposure to radiation and to radioactive material released by a licensee, or to another source of radiation either within the licensee's controlled area or in unrestricted areas, but not to include occupational dose, or natural background doses, doses from medical practices, or from voluntary participation in medical research programs.

15. Shallow Dose Equivalent- (H_s), The external exposure of the skin or an extremity, is taken as the dose equivalent at a tissue depth of 0.007 cm ($7mg/cm^2$)

16. Total Effective Dose Equivalent- The sum of the deep dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures).

AA38-2

APPENDIX C

PROCEDURE MATRIX WITH EXISTING AND PROPOSED 10 CFR 20

PROCEDURE NUMBER	RADIATION PROTECTION PROCEDURE TITLE	10CFR20 IMPACT OLD	NEW
1001.01	*CPS Organization, Responsibilities and Minimum Qualifications	ANSI 3.1 ANSI N546 RG 1.8, 8.8	n20.101
1002.01	*Indoctrination and Training	o20.206	n20.101
1003.01	*Design Control and Modification	RG 8.8, 8.10	
1005.01	*Preparation, Review, Approval, and Implementation of and Adherence to Station Procedures and Documents	o20.205 o20.101	n20.101 to n20.906
1005.02	*Organization of the Station Operating Manual		n20.101
1017.01	*Plant Records Preparation, Transmittal and Retention	o20.401	n20.1101
1017.02	*Training Records	o20.206	n20.1101
1019.04	*Tool and Material Control for the Refuel Floor and Fuel Handling Floor During Refueling Outages	o20.101	n20.801 n20.101
1019.05	*Dry Radioactive Waste and Laundry Handling Program	o20.207 o20.306	n20.1001 n20.101
	* = Not Radiation Protection Department Procedures, but are either a major impact on the RP Program, or are programs required specifically by the 10CFR20 Regulations.		
1023.10	Containment Purge Operational Data Gathering Program and Containment Access Management Program	o20.105	n20.301
1024.10	Radiological Controls Training Program	o20.206	n20.101

AA38-2

PROCEDURE NUMBER	RADIATION PROTECTION PROCEDURE TITLE	10CFR20 IMPACT	
		OLD	NEW
1024.15	Exposure Control and Routine Exposure Report	o20.101 o20.103(c)	n20.201 (2)n20.601 n20.701
1024.16	Radiation Health Advisory Board	NR	NR
1024.20	Radiological Work Control		n20.101
1024.25	Radiological Access Control		n20.101
1024.30	Radioactive Material Control	o20 207	n20.208
1024.35	Control of Radioactive Effluents	o20.106	n20.301
1024.40	Contamination Control	o20.101	n20.101
1024.45	Management of Radiation Protection Department Computer System	XX	n20.101
1024.50	Radiological Environmental Monitoring Program	o20.106	n20.1007
1024.60	Respiratory Protection Program	o20.103	n20.703
1024.65	ALARA Program	R.G.8.8	n20.101
1024.80	Employee Compensation Request	NR	NR
1901.10	Radiation Protection Department Organization and Functions	NR	n20.101
1902.10	Radiological Controls Training Requirements	o20.206 ANSI 3.1	n20.101 ANSI 3.1
1903.11	Dose Extensions	o20.101 o20.103	n20.201 n20.206
1903.20	External Exposure Monitoring	o20.202	n20.502
1903.21	Noble Gas and Beta Dose Equivalent Calculations	o20.103	n20.203
1903.25	Visitor Dosimetry	o20.202	n20.301
1903.30	External Exposure Investigations	o20.405	n20.1203
1904.10	Internal Exposure Bioassay	o20.108	n20.204
1905.10	Radiation Work Permit (RWP)		n20.101

AA38-2

PROCEDURE NUMBER	RADIATION PROTECTION PROCEDURE TITLE	10CFR20 IMPACT OLD	NEW
1905.20	Radiological Area Posting	o20.302	n20.902
1905.21	High Radiation Area Key Control	o20.203	n20.601 n20.602
1905.30	Control of Radiography Operations	o20.103 o20.203	n20.602 n20.603
1905.31	Control of Diving Operations	o20.103	n20.206
1905.32	Initial Drywell Entries	o20.201 o20.203	n20.501,2 n20.601
1906.10	Access Control - Radiation Protection	o20.201	n20.101 n20.501
1906.20	Containment Access Management Program (CAMP)	o20.201	n20.101 n20.501
1907.10	Receipt of Radioactive Material	o20.205	n20.906
1907.20	Radioactive Source Control, Leak Testing, and Accountability	o20.207	n20.801,2
1907.30	Control of Radioactive Material	o20.207	n20.801,2
1908.10	Liquid Radioactive Effluent Release	o20.105,6	n20.1007 n20.301,2
1908.20	Gaseous Radioactive Effluent Release	o20.105,6	n20.301,2
1909.20	Radiological Reporting	o20.401-9	n20.1201-6
1909.21	Radiological Improvement Reports		n20.101
1910.01	Radiation Protection Computer System Management		n20.101
1910.10	Management of the ND1066		n20.101
1910.20	Management of the ND6685 Computers		n20.101
1910.30	Management of the Whole Body Counter	o20.103,8	n20.202,4
1910.50	Computerized Dose Record Repair	o20.407	n20.1106
1910.60	Radioactive Release Report Generating System Database Maintenance	o20.405	n20.1203
1910.70	AR/PR System Management	o20.106	n20.302
1911.10	Radiological Control Instrumentation Calibration and Control		n20.101

AA38-2

PROCEDURE NUMBER	RADIATION PROTECTION PROCEDURE TITLE	10CFR20 OLD	IMPACT NEW
1912.10	Use of Respiratory Protection Equipment	NUREG0041	n20.703
1913.02	Radioactive Waste Storage and Inventory	o20.302,3, o20.306	n20.1001,2 n20.1005,6
1913.04	Solid Radioactive Waste Radiological Reporting	o20.401	n20.1108
1914.15	Control of Temporary Shielding		n20.101
3920.00	RadWaste Operating Philosophy	?	?
4979.01	High Airborne Radioactivity	o20.103	n20.204 n20.703,1203
4979.04	Abnormal Airborne Radioactive Release	o20.405	n20.1203
4979.05	Abnormal Release of Radioactive Liquids	o20.103,6	n20.1203
4979.06	Radioactive Spill	o20.103,6	n20.1203
4979.07	Dropped Fuel Bundle in the Fuel Building	o20.101	n20.101, 601,2,3
4979.08	Dropped Fuel Bundle in the Containment Building	o20.103,6	n20.101, n20.601,2
4979.09	Response to Fuel Handling Building Area Radiation Monitor (ARM) Alarm	?	?
4979.10	Containment Building Exhaust Process Radiation Monitor (PRM)(Address:201-204) Problem	T.S.	T.S.
4979.11	Containment Building Fuel Transfer Pool Vent Plenum PRM (Address: 205-208) Problem	T.S.	T.S.
4979.12	Fuel Building Ventilation Exhaust PRM (Address: 209-212) Problem	T.S.	T.S.
4979.13	Main Control Room Air Intake PRM (Address:213-216) Problem	T.S.	T.S.
4979.14	Station HVAC Exhaust PRM (Address: 125-126) Problem	T.S.	T.S.
4979.15	Standby Gas Treatment System Exhaust PRM (Address: 127, 128) Problem	T.S.	T.S.

AA38-2

PROCEDURE NUMBER	RADIATION PROTECTION PROCEDURE TITLE	10CFR20 IMPACT OLD	NEW
4979.16	Containment Continuous Purge Exhaust PRM (Address: 217-220) Problem	T.S.	T.S.
4979.17	Pretreatment Off-Gas PRM (Address: 131) Problem	T.S.	T.S.
4979.18	Post-Treatment Off-Gas PRM (Address: 132, 133) Problem	T.S.	T.S.
4979.19	Radwaste Effluent PRM (address: 140) Problem	T.S.	T.S.
4979.20	Plant Service Water PRM (Address: 134) Problem	T.S.	T.S.
4979.21	Component Cooling Water PRM (Address: 135) Problem	T.S.	T.S.
4979.22	Residual Heat Removal PRM (Address: 136, 137) Problem	T.S.	T.S.
4979.23	Fuel Pool Heat Exchanger PRM (Address: 138, 139) Problem	T.S.	T.S.
4979.24	Main Control Room (MCR) Direct Radiation Area Radiation Monitor (Address: 030) Problem	T.S.	T.S.
4979.25	Fixed or Portable Digital Area Radiation Monitor Problem	T.S.	T.S.
4979.27	Continuous Air Monitors (Address: 102-123) Problem	T.S.	T.S.
4979.28	Meteorological Tower Digital Acquisition Module (DAM) (Address: 150) Problem	T.S.	T.S.
4979.29	HVAC/SGTS Stack Flow DAM (Address: 151) Problem	T.S.	T.S.
4979.30	Liquid Flow DAM (Address: 152) Problem	T.S.	T.S.
4979.31	SGTS Exhaust High Range Monitor-Accident Monitor (AXM) (Address: 221) Problem	T.S.	T.S.

AA38-2

PROCEDURE NUMBER	RADIATION PROTECTION PROCEDURE TITLE	10CFR20 IMPACT OLD	NEW
4979.32	HVAC Vent High Range Monitor Accident Monitor (AXM) Address: 222) Problem	T.S.	T.S.
4979.33	Dropped Fuel Bundle Warning System Alarm	T.S.	T.S.
5140.01	AR/PR Alarm Panel 5140 Annunciators	T.S.	T.S.
7001.01	Radiation Protection Indoctrination	o20.206	n20.101
7001.02	Radiation Protection Key Control	o20.203	n20.601,2 n20.801
7001.03	Radiation Protection Shift Logging and Turnover		n20.101
7001.04	Radiation Protection Follow-up Report		n20.101
7002.01	MPC-Hr (Maximum Permissible Concentration-Hour) Accountability	o20.103 o20.401	n20.204 n20.502 n20.704
7002.02	Cleaning, Repair and Certification of Respiratory Protection Equipment	NUREG0041	n20.704 NUREG0041
7002.03	Respirator Fitting Using the Dynatech Frontier Corporation Model 260B	NUREG0041	n20.703
7002.04	Preventative Maintenance on Dynatech Frontier Respirator Fit Test Booth		n20.101
7002.05	Operating the Bauer Unus 5 Air Compressor		n20.101
7003.01	Personnel Decontamination	o20.405	n20.101
7003.02	Skin Dose Calculation	o20.103	n20.502
7003.20	Maintaining Exposure History Records	o20.401	n20.1106
7013.10	Shipping Radioactive Material	o20.311, o20.401	n20.1006 n20.1108
7013.11	RADMAN, RAMSHIP and TRASHP Database Maintenance		n20.101
7013.20	Packaging Radioactive Material	o20.203	n20.904
7013.40	10CFR61 Compliance Program	10CFR61	10CFR61
7013.41	Classification of Radioactive Waste	o20.301	n20.1001

AA38-2

PROCEDURE NUMBER	RADIATION PROTECTION PROCEDURE TITLE	10CFR20 OLD	IMPACT NEW
7017.01	Radiation Protection Records	o20.401	n20.1102
7092.01	Operation of the Gastech Model 1562 Protechtor and Industrial Scientific Model MX 241	o20.206	n20.101
7092.02	Operation of the Drager Multi-Gas Detector	o20.206	n20.101
7092.03	Operation of the Gastech Model 1220 Gas Alarm System	o20.206	n20.101
7092.04	Operation of the Alnor Alarming Dosimeters	o20.206	n20.101
7100.00	Clinton Power Station Radiation Survey Sheets F001-F240	o20.201	n20.501
7105.01	Radiological Surveys	o20.201	n20.501
7105.02	Air Sample Assay	o20.103	n20.502
7105.03	New Fuel Receipt Surveys	o20.201	n20.501
7105.10	Hot Particle Contamination Control	o20.201	n20.501
7105.11	Conduct of Transfer Evolutions		
7105.12	Conduct of Refuel Activities		
7179.01	Radiological Environmental Reports	o20.405	n20.302, n20.1203
7179.10	Radiological Environmental Sample Storage and Shipment		
7179.11	Radiological Environmental Soil and Snow Sampling	o20.105	n20.302
7179.16	Radiological Environmental Grass Sampling	o20.105	n20.302
7179.17	Radiological Analysis Laboratory Safety Manual (DRAFT)	Check wording, refs	
7179.20	Radiological Environmental Sample Analysis Scheduling and Preparation	o20.105	n20.302

A438-2

PROCEDURE NUMBER	RADIATION PROTECTION PROCEDURE TITLE	10CFR20 IMPACT OLD	NEW
7179.30	Quality Program of the Radiological Environmental Monitoring Program's Analysis Laboratory (DRAFT)	Ck wording, refs	
7179.31	Chemical Inventory Record (DRAFT)		
7179.32	Reagent Preparation (DRAFT)		
7179.33	Calibration and Operation of Electronic Analytical Balance (DRAFT)		
7180.01	Stack Effluent Sampling and Analysis	o20.105	n20.302
7180.10	Drywell Leak Detection Continuous Air Monitor Sampling and Analysis	o20.105	n20.302
7211.01	Operation of the Gamma Calibrator	o20.206	n20.101
7211.02	Operation of the Model 142-10 Dosimeter Irradiator	o20.206	n20.101
7211.03	Operation of the Model 149 Neutron Source	o20.206	n20.101
7211.04	Operation of the Victoreen Model 570 Condenser R-Meter	o20.206	n20.101
7211.05	Radiation Protection Department Survey Instrument Response Checks	o20.206	n20.101
7211.07	Operation of the Victoreen High Range Field Calibrator Model 878-10	o20.206	n20.101
7211.10	Operation of the PRS-1	o20.206	n20.101
7211.11	Operation of the PRS-2P/NRD	o20.206	n20.101
7211.31	Operation of TASC-12 Alpha/Beta Counting Systems	o20.206	n20.101
7410.30	Operation of the Whole Body Counter	o20.206	n20.101
7410.31	Operation of the ND6685 - HPGe Gamma Spectroscopy System	o20.206	n20.101
7410.32	Operation of the Gamma-10 Portal Monitor	o20.206	n20.101

AA38-2

PROCEDURE NUMBER	RADIATION PROTECTION PROCEDURE TITLE	10CFR20 IMPACT OLD	NEW
7410.33	Operation of the PCM-1A/B	o20.206	n20.101
7410.35	High Activity Sample Gamma Analysis	o20.206	n20.101
7410.62	Effluent Management Reports	o20.105,6	n20.301 n20.1203
7410.64	Emergency Offsite Dose Calculation Using the SR Computer System	o20.106	n20.301
7410.65	Operation of the Polaroid Video Printer and Processor	o20.206	n20.101
7410.71	Operation of the AR/PR Control Terminals	o20.206	n20.101
7410.72	Operation of the AR/PR CRT	o20.206	n20.101
7410.73	Operation of the Emergency Operations Facility Continuous Air Monitor	o20.206	n20.101
7410.75	Operation of the Digital AR/PR Monitors	o20.206	n20.101
7410.76	Operation of the Analog Area Radiation Monitors	o20.206	n20.101
7410.77	Operation of the Eberline Accident Range Monitors	o20.206	n20.101
7410.78	Operation of the Dropped Fuel Bundle Warning System	o20.206	n20.101
7410.80	AR/PR Setpoint Modification	o20.106	n20.301,2
7410.84	Monthly Non-Technical Specification ARM Channel Checks	o20.206	n20.101
7910.30	Calibration of the Whole Body Counter	o20.103,6 o20.108	n20.204 n20.1102
7910.31	Efficiency and Energy Calibration of the HPGe Detector	o20.101,3 o20.401	n20.502 n20.1102
7910.40	Calibration of the Beta Aerosol Beacon	o20.103,6 o20.108	n20.204 n20.1102
7910.73	PING-1A Calibration Data Sheet	o20.401	n20.1102
7910.74	Analog ARM Channel Functional Test Data Sheet	o20.401	n20.1102

AA38-2

PROCEDURE NUMBER	RADIATION PROTECTION PROCEDURE TITLE	10CFR20 IMPACT	
		OLD	NEW
7910.75	Monthly Digital ARM Source Checks	o20.101	n20.201
7910.76	Monthly Exhaust Duct PRM Source Checks	o20.106	n20.301
7910.84	Monthly Non-Technical Specification ARM Channel Checks	o20.101	n20.201
7911.01	Calibration of the Gamma Calibrator	o20.101 o20.401	n20.201 n20.1102
7911.02	Calibration of the Model 142-10 Dosimeter Irradiator	"	"
7911.03	Calibration of the Model 149 Neutron Source	"	"
7911.04	Calibration of in Air Gamma Sources	"	"
7911.05	Statistical Check of Scalers and Counters	"	"
7911.10	Calibration of the PRS-1	"	"
7911.11	Calibration of the PRS-2P	"	"
7911.12	Calibration of the MS2-/MS3	"	"
7911.13	Calibration of the RO-2/RO-2A	"	"
7911.14	Calibration of the RO-7	"	"
7911.16	Calibration of the E-120	"	"
7911.17	CAlibration of the E-520	"	"
7911.18	Calibration of the Teletector (6112B)	"	"
7911.20	Calibration of the PAC-1SAGA	"	"
7911.21	Calibration of the RM-20 and the RM-14	"	"
7911.22	Calibration of the E-530N	"	"
7911.23	Calibration of Pocket Dosimeters	"	"
7911.24	Calibration of the RADECO H-809C, H-809V and H-809B2	"	"

AA38-2

PROCEDURE NUMBER	RADIATION PROTECTION PROCEDURE TITLE	10CFR20 IMPACT OLD	NEW
7911.25	Calibration of the Eberline RAS-1	"	"
7911.26	Calibration of the E-130A	"	"
7911.27	Calibration of the BC-4	"	"
7911.28	Calibration of the PRM-6 with a AC-3-7 Probe	"	"
7911.30	Calibration of the PNR-4	"	"
7911.31	Calibration and Performance Verification of the TASC-12 Alpha and Beta Counter	"	"
7911.32	Calibration of the AMS-2	"	"
7911.33	Operation and Calibration of the Water Compositer Sampler	"	"
7911.34	Calibration of the Lapel Air Sampler	"	"
7911.35	Calibration of the ALNOR Alarming Dosimeters	"	"
7911.36	Calibration of the FAG FH40 F5 and To (DRAFT)	"	"
7911.37	Calibration of the FAG FH40 FT Telescope (DRAFT)	"	"
9911.11	Liquid PRM Surveillance Monthly Source Check	"	"
9911.16	Gaseous PRM Surveillance Monthly Source Checks	"	"
9911.17	AXM Surveillance Monthly Channel Checks	"	"
9911.24	AR/PR Shiftly/Daily Surveillances	"	"
9911.50	Liquid Discharge Surveillance	"	"
9911.51	Liquid Radioactive Effluent Surveillance Monthly	"	"
9911.59	Gaseous Radioactive Effluent Surveillance-Monthly	"	"

AA38-2

PROCEDURE NUMBER	RADIATION PROTECTION PROCEDURE TITLE	10CFR20 OLD	IMPACT NEW
9911.60	Gaseous Radioactive Effluent Surveillance	"	"
9911.61	Vent Exhaust Treatment System Surveillance - Trigger	"	"
9911.70	Radiological Environmental Monitoring Program (REMP) Surveillance For Airborne Radioiodine and Particulates - Monthly	o20.105,6 o20.401	n20.302 n20.1102
9911.71	REMP Milk Monitoring Surveillance	"	"
9911.72	REMP Direct Radiation Monitoring Surveillance	"	"
9911.73	REMP Aquatic Pathway Sampling Surveillance	"	"
9911.75	REMP Surveillance Annual Land Use Census	"	"
9911.78	REMP Surface Water Monitoring Surveillance	"	"
9911.79	REMP Ground Water Monitoring Surveillance	"	"
9911.80	REMP Vegetation Monitoring Surveillance	"	"
9974.01	Sealed Source Contamination Leak Test	"	"
9974.02	Start-up Source Contamination Leak Test	"	"

AA38-2

APPENDIX D

COST ESTIMATES FOR IMPLEMENTING PROPOSED REVISION 10CFR20

Program Activity	Est. 1989 $
Occupational Dose Limits	180,000
Summation Internal+ External Dose	960,000
Embryo/Fetus Exposure Limits	50,000
Individual Monitoring	20,000
Records-Individual Monitoring	240,000
Records of Doses to Public	25,000
Reports of Personnel Monitoring	90,000
Personnel Training	175,000
Procedure Revisions	125,000
TOTAL (Does NOT include contractor services)	1,865,000

ESTIMATED ADDITIONAL COST TO MAINTAIN COMPLIANCE WITH NEW 10CFR20

Program Activity	Annual Est. Added Cost In 1989 Dollars ($)
Occupational Dose Limits	60,000
Summation Internal+ External Dose	190,000
Embryo/Fetus Exposure Limits	40,000
Individual Monitoring	75,000
Records-Individual Monitoring	2,500
Records of Doses to Public	15,000
Reports of Personnel Monitoring	15,000
Personnel Training	--0--
Procedure Revisions	--0--
TOTAL (Does NOT include contractor services)	$397,000