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SUBJECT: BGV PLASAR COMMENTS ON SECTION 7.0

The attached document is the completed Q-1 phase of the BGV PLASAR for Section 7, "Occupational Radiation Protection." The comments include input from Dennis Sollenberger, Yvonne Young and John Starmer.

If you have any questions, or require further clarification, please advise.

ORIGINAL SIGNED BY  
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Enclosure: As stated

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SUBJECT ABSTRACT: BGV PLASAR REVIEW

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## 7 OCCUPATIONAL RADIATION PROTECTION

Comment \_\_\_\_\_: Section 7 (p.7-1 thru 7-17)

The occupational radiation protection program described in Section 7 of the BGV PLASAR consists of generic comments apparently designed to address key components of that section as set forth in the Standard Format and Content Guidance (NUREG-1199). However, the program (particularly Sections 7.1 and 7.4) scarcely provides as much information as is presented in the NUREG. In many instances, references are made to related information contained in Appendices or the Supporting Information Packages (SIP's). However, these references are not detailed enough to facilitate line item review as required in a license application process.

An actual license application would require more detailed information than is presented in Section 7. NUREG/CR-3343, NUREG-1199, Revision 1 and NUREG-1200, Revision 1 provide guidance on the level of detail expected in an actual license application. Similarly, the organization of Section 7.0 in an actual license application should be developed in sufficient detail to ensure implementation of the radiation safety program. Section 7.0 of the BGV PLASAR does not describe a program readily allowing implementation, nor is it necessarily specific to a BGV facility.

Consequently, not enough information is presented to allow a thorough and independent technical assessment, since the intent of NRC's review of the

BGV PLASAR is to critique the caliber of the information submitted in the context of a license application. Regardless, the NRC Staff has undertaken to the extent practicable, a review of the submitted program in order to facilitate the PLASAR process. Review comments are identified and elaborated upon in the following subsections which track the BGV PLASAR's submission for Section 7.

Comment \_\_\_\_\_: Section 7.1.1 ALARA POLICY (p. 7-1)

- (a) The first paragraph of this section sets forth a general commitment to maintaining radiation exposures as low as is reasonably achievable (ALARA) as required in 10 CFR 20.1(C). In addition, a commitment to ALARA will supposedly be expressed in various policy statements to be issued by site and corporate management. However, insufficient detail is provided regarding achievement of these objectives through an interface between policy considerations, design considerations and operational considerations.
  
- (b) The second paragraph states that the proposed facility organizational structure for achieving ALARA considerations is described by reference to Chapter 8 (Conduct of Operations). However, that section of the BGV PLASAR application contains a major caveat warning of its incomplete status. In fact, the only information on organizational structure provided in that section is a reference to line items set forth in NUREG-1199, Revision 1 and NUREG-1200, Revision 1. Therefore, no review

of the organizational structure to be utilized to achieve ALARA in this BGV facility is possible.

- (c) The fifth paragraph contains management responsibilities which are primarily a recapitulation of primary program elements identified in NRC Regulatory Guide 8.8 (RG 8.8) and NUREG-1199, Revision 1. In an actual license application, these responsibilities and all aspects of the ALARA policy must be clearly identified in written administrative procedures and instructions for operations involving potential exposure of personnel to radiation.
- (d) The sixth paragraph, identified as Personnel Qualifications, states that qualifications for the site Radiation Safety Officer (RSO) are contained in Section 8 of the PLASAR, and are based upon recommendations in ANSI/ANS-3.1-1981 and Regulatory Guide 1.8. This presents two major problems. First, Chapter 8 is an incomplete submission and does not contain any information regarding qualifications for the RSO. Second, the criteria set forth in the cited documents are designed primarily for reactor facilities rather than low-level waste burial sites. In an actual license application, it would be necessary to identify minimum acceptable training and experience criteria for the site RSO and other technical personnel.

Comment \_\_\_\_\_: Section 7.1.2 ALARA DESIGN (p. 7-2)

The information in this section primarily focuses upon radiation safety training. A few examples of design criteria are mentioned, e.g., thick blanket of cover over waste before roof construction etc., but, this information is of minimal value for BGV design considerations to achieve the ALARA concept. In an actual license application, detailed information clarifying facility design features and radioactive waste handling procedures would be required. Typically, such information should be presented in detail within Section 7.3 with a summary of the impact on ALARA provided in this section.

Comment \_\_\_\_\_: Section 7.1.3 OPERATIONAL ALARA (p. 7-3)

This section provides a few general comments for implementing an operational ALARA program and references the use of Regulatory Guides 8.8, 8.10 and NUREG/CR-3343 for additional guidance. Although previous operational experience is referenced as a basis for implementing the ALARA program, the source of the applicant's experience is not clarified.

The implementation of operations in an ALARA program begins with the development of site-specific operating procedures endorsed by management and carried out by the Facility Radiation Safety Officer (FRSO). Standard operating procedures (SOP's) must be developed and submitted with the license application for all phases of waste handling. SOP's should include a detailed description of the constraints on their use, e.g., when special work permits

(SWP's) should be used, etc. The discussion of an operational ALARA program must consider: (1) personnel awareness; (2) performance audits; (3) radiation protection capability; (4) training; (5) RSO authority; and (6) modifications to operations.

Furthermore, programmatic information in a license application should be self-contained where possible. The application may incorporate by reference information contained elsewhere, such as in previous applications, statements, or reports filed with the Commission, only if these references are clear and specific.

Comment \_\_\_\_\_: Section 7.1.4 RADIATION PROTECTION CONSIDERATIONS (p. 7-4)

This section merely references a commitment to a radiation protection plan consistent with the recommendations of NUREC/CR-3343. The actual radiation protection plan is to be described in Section 7.4. In an actual application, this subsection would describe how the radiation protection program in Section 7.4 will provide the information and controls to maintain occupational doses ALARA.

Comment \_\_\_\_\_: Section 7.2 RADIATION SOURCES (p. 7-4)

This section of the BGV PLASAR references Section 6.1.1, Appendix A, and the Supporting Information Package (SIP 1) to include radiological source term information. Contrary to NUREG-1199, Revision 1 and NUREG-1200, Revision 1,

Section 7.2 of the applicant's BGV PLASAR does not adequately describe radiation sources that are the design basis of the BGV facility radiation protection program for such considerations as: shielding; ventilation systems; special storage locations and conditions; traffic or access control; special plans; monitoring equipment; establishing facility design features; plans and procedures development; and occupational radiation exposure assessments. Nor does this section consider all of the radionuclides (e.g., Uranium-234 and Thorium-230 etc.) in the source term inventory or justification for the use of average radionuclide concentration and content values as input in the design process shielding codes.

Comment \_\_\_\_\_: Section 7.2.1 CONTAINED SOURCES (p. 7-4)

- (a) This section describes the daily through put of waste handled at the BGV facility based on the source term description identified in Section 6.1.1. The evaluation of the source term inventory is discussed in the NRC staff comments on Chapter 6 of the PLASAR. However, descriptions of contained sources, applicable to the Radiation Safety Program described in SRP 7.2, should include: (1) scaled drawings of the facility that can be related to tables containing the pertinent quantitative source parameters; (2) descriptions of the positions of the sources, including their locations, approximate sizes and shapes, and relevant operating experience.

- (b) The BGV PLASAR should provide clear justification for: (1) the use of average concentrations and nuclide content values (discussed in various sections of the PLASAR) as input to shielding design; (2) the significance of exposure rates discussed in other sections of the BGV PLASAR such as those listed in Section 7.3; and (3) the exposure rate distribution of the packages at the highest and lowest extremes of the ranges discussed in Appendix F (i.e.,  $>10$  R/hr, and  $<10$  mR/hr, respectively).

Comment \_\_\_\_\_: Section 7.2.2 AIRBORNE RADIOACTIVE MATERIAL SOURCES (p. 7-5)

This section of the BGV PLASAR assumes that except for airborne releases from a significant suspendible component of Class A dry waste, or from sources involving damaged or non-compliant container waste packages, accident conditions will be rare since all waste classes are solidified or shipped in high integrity containers (HIC's). Based on this assumption, minimal information is provided about the design of ventilation systems or personnel protective measures, although certain areas of the BGV, e.g. decontamination area or container inspection areas, should be designed with airborne contamination in mind.

Bounding cases for operational occurrence and accident conditions are discussed in Section 6. The NRC staff has included a number of comments in its review of that section regarding dose factors and justification of assumptions used for dose assessments to workers.



Comment \_\_\_\_\_: Section 7.3 RADIATION PROTECTION DESIGN FEATURES (p. 7-5)

This section of the BGV PLASAR provides descriptions of the radiation protection design features to ensure ALARA occupational exposures at the BGV facility. However, it does not provide adequate descriptions of the objectives of the radiation design features as delineated in NUREG-1199, Revision 1, and NUREG-1200, Revision 1. In addition, the description of radiation design features should consider the need to allow quick entry and easy access to ensure ALARA occupational exposures. This section should also include adequate descriptions of: (1) transport vehicle decontamination facilities; (2) the health physics facility; (3) the disposal bunker facilities; (4) other facility designs to ensure ALARA occupational exposures; (5) radiation zone designations and related design dose rates; and (6) descriptions of radioactive monitoring equipment in accordance with RG 8.8. The design and operation of the BGV facility appears to be somewhat independent of the radiation sources identified in Section 7.2.

Comment \_\_\_\_\_: Section 7.3.2 SHIELDING (p. 7-10)

This section of the BGV PLASAR describes shielding as an additional benefit to the ALARA design process and specifies the MICROSIELD computer code for use in determining the shielding calculations. However, this section does not provide the assumptions and the parameters chosen for the shielding calculations. Adequate shielding descriptions would include discussions of: (1) the shield thicknesses for gamma ray sources determined from the calculational codes;

(2) why guidance on the fabrication and installation of concrete shields for occupational radiation protection at the BGV facility was or was not followed in accordance with RG 1.69 and ANSI N101.6-1972; and (3) why additional applicable criteria on shielding and isolation in radiation protection were or were not followed in accordance with any other guidance (i.e., RG 8.9). Also, there is not a clear discussion of the dose reduction resulting from the shielding designed into the facility.

Comment \_\_\_\_\_: Section 7.3.3 VENTILATION (p. 7-11)

This section does not provide information on ventilation, except for a statement that a negative pressure ventilation with HEPA filtration of the exhaust is provided for all areas of the Receiving and Storage Building. In fact, this section contains a major caveat warning that such information is omitted due to its lack of relevance as an assessment of disposal technology.

This section of the BGV PLASAR should describe: (1) personnel protection features of the ventilation system design; (2) design aspects applicable to airborne radioactivity removal from equipment, corridors, and operating areas including disposal units occupied by personnel; (3) design features for controlling concentration levels for the above areas; (4) cleaning system design illustrative samples and layout (i.e., filters, mountings, access doors, services galleries, etc.); and (5) provisions for testing, isolation and decontamination, etc.

Comment \_\_\_\_\_: Section 7.3.4 AREA RADIATION AND AIRBORNE RADIOACTIVITY  
MONITORING INSTRUMENTATION (p. 7-11)

Except for the assertion that area radiation monitors and airborne radioactivity monitoring are provided in the receiving and inspection, decontamination/repackaging, and storage areas, the BGV PLASAR does not provide information on area radiation and airborne radioactivity monitoring instrumentation. Again, this section contains a major caveat warning that detailed information as requested in NUREG-1199, Revision 1 is omitted as not necessary for the assessment of disposal technology.

This section should provide information on radiation protection facilities, instrumentation, and equipment as requested in NUREG-1200 Revision 1, NUREG-1199 Revision 1, and the RG 8.8, pages 8.14 - 8.15 (i.e., the ranges for portable instruments and personnel monitoring instrumentation, and a complete list of instruments and equipment). It would be helpful in the review process if this data were provided in tabular form.

Comment \_\_\_\_\_: Section 7.3.5 DOSE ASSESSMENT (p. 7-11)

This section of the BGV PLASAR briefly describes the shielding calculation code ISOSHIELD used for dose assessments to LLW workers. While this section references Appendices F and G and SIP's 4 and 5, the assumptions contained in the references are not clear. Also, a summary of exposure calculations was referenced but not clearly identified. It is assumed that the cited

information is set forth in Tables 7.3-2, 7.3-3, and 7.3-4. An adequate dose assessment would include documentation of all assumptions presented, calculations used in the assessments, radiation zone results including numbers and types of workers, expected and design dose rates, and projected person-rem doses, including legible information that can easily be related to the applicable tables provided. Further, it is not clear in the SIP's how the exposures from emplaced or stored waste were included in the dose assessment of workers.

Comment \_\_\_\_\_: Section 7.3.5.1 SOURCE TERM FOR WORKER DOSES (p. 7-12)

This section references Section 6.1.1 of the BGV PLASAR to describe the source term. However, Section 6.1.1 contains only background information which is inadequate for determination of worker doses. Information on source term is found throughout Section 6 (e.g., information on waste packages is provided in Section 6, Table 6.19), whereas, information on the source terms for workers is provided in various other sections (Appendices and SIP's) of the BGV PLASAR. Therefore, it is unclear what information is utilized in determining occupational source term for the different aspects of facility operation. The few example sheets of the MICROSHIELD provided, and some of the computations produced from this code, can not be easily related to tables containing pertinent quantitative source parameters. The BGV PLASAR plans and drawings should include source descriptions that can be easily identified and related to information provided on the source term's quantitative parameters. Also, the BGV PLASAR should adequately describe shapes and approximate sizes of the

sources, using operating experience where applicable. In addition, the BGV's operational procedures to ensure ALARA compliance for radiation exposures to workers must be addressed. However, the operations procedures are to be set forth in Section 4 which contains a major caveat warning of their omission due to the hypothetical nature of this application.

Comment \_\_\_\_\_: Section 7.3.5.2 COMPUTER MODELS FOR WORKER DOSES (p. 7-12)

This section of the BGV PLASAR discusses the computer model used for worker occupational dose assessments. Reference is made to an electronic spread sheet identifying numbers of workers, durations of each activity, and dose rates at various distances from the waste. However, some of the data (e.g., Table G1-1) on the "spreadsheet" are not easily related to the discussion in the text of the BGV PLASAR, and are not presented in a systematic way for considering and evaluating dose-reducing changes in facility operations and design. Documentation requirements, review procedures, and the principal dose assessments related to ALARA changes should be specifically identified.

Comment \_\_\_\_\_: Section 7.3.5.3 WASTE HANDLING ACTIVITIES (p. 7-12)

This section references the process flowsheet for identifying waste receipt, handling, processing, and disposal activities at the BGV facility as explained in Chapter 4. However, neither Chapter 4 nor this section provides detailed operating procedures necessary in order for the NRC staff to provide a comprehensive review of the management controlled waste handling activities

within the BGV facility. The BGV PLASAR's descriptions of waste handling activities should be presented in detail in Section 4.2 with a summary of its impact on occupational exposure provided in this section.

Comment \_\_\_\_\_: Section 7.3.5.4 MANPOWER ACTIVITIES (p. 7-12)

The BGV PLASAR describes estimates for the number and classification of workers, including the average distances from each radiation exposure source, and time spent on the operation at these distances.

The BGV PLASAR should clarify the discrepancy between information presented in Section 7.3.5.4, page 7-12 and Appendix G1.4, page G-20. Specifically, Section 7.3.5.4 states that there are 22 work activity classifications with 35 specific operations, whereas, Appendix G1.4, page 20, identifies 26 work activity classifications and 20 specific operations. Also, this section should provide clear and more detailed explanations of information presented in the example sheets.

Further, this section of the BGV PLASAR does not reference the fact that worker exposure information is also contained in Appendix G. Appendix G contains differences in units for exposure calculations (i.e., R/hr or R/yr) which are not clarified in Section 7.3.5.4.

Comment \_\_\_\_\_: Section 7.3.5.5 DOSE RATES FOR HANDLING ACTIVITIES (p. 7-12)

This section of the BGV PLASAR describes shielding/distance dose configurations. However, it does not adequately describe shielding/distance configurations, during "particular operations" in the presence of an open cell of emplaced waste in a disposal vault, or through the roof of a closed vault, or for other configurations in terms of limiting worker exposure as recommended in NUREG-1200. This discussion also fails to describe implementation of ALARA design philosophy.

Comment \_\_\_\_\_: Section 7.3.5.6 WORKER DOSE ESTIMATES (p. 7-14)

This section of the BGV PLASAR assumes that the performance objectives of the appropriate sections of 10 CFR will be met due to the detailed annual cumulative worker dose assessments for all routine disposal operations in Tables 7.3-2, 7.3-3, and 7.3-4. This section should demonstrate that all assumptions are valid and reasonable, including referencing other sections regarding worker dose estimates, as appropriate. Information provided in various sections of the BGV PLASAR should be consistent.

Comment \_\_\_\_\_: Section 7.3.6 REFERENCES (p. 7-14)

This section identifies only three reference documents, and does not include all of the appropriate sections of the BGV PLASAR applicable to this section.

Comment \_\_\_\_\_: Section 7.4 RADIATION PROTECTION PROGRAM (p. 7-14)

Section 7.4 of an actual license application should include a detailed description of the administrative organization of the radiation protection program, including the authority and responsibility of the individual occupying each position. In addition, it should provide a detailed description of all site-specific health physics procedures designed to satisfy guidelines contained in NUREG/CR-3343, NUREG-1199, Revision 1 and NUREG-1200, Revision 1. Such information should include a listing of all equipment, instrumentation, and facilities used in conducting the program. Substantial discussion should be devoted to internal and external personnel monitoring including methods of recording, reporting, and analyzing results as well as all requirements set forth in 10 CFR Part 20. Above all, the described radiation safety program must be capable of implementation within the BGV facility.

Comment \_\_\_\_\_: Section 7.4.1 RADIATION PROTECTION (p. 7-14)

The information provided in this section is inadequate. This section states that the radiation protection program is based on NUREG/CR-3343, but does not elaborate on the various program elements outlined in that document. The majority of the text for the section is a verbatim reiteration of the information contained in Section 7.4 of NUREG-1199, Revision 1 although certain operational health physics concerns such as external exposure control are listed.



Intentionally Omitted Information:

<u>Review Topic</u>	<u>PLASAR Page</u>	<u>SRP NUREG-1200, Rev.1 (p. 7.3-2)</u>
Section 7.3.3 Ventilation	P. 7-11	7.3.2.3
Section 7.3.4 (p. 7-11) Area Radiation and Airborne Radioactivity Monitoring Instrumentation	P. 7-11	7.3.2.4