

LOW-LEVEL WASTE LICENSING BRANCH REVIEW OF NECO'S APPLICATION
FOR RENEWAL OF THE BEATTY, NEVADA LICENSE

INTRODUCTION

The Nuclear Engineering Company, Inc. (NECO), submitted to the state of Nevada, an application for renewal of license number 13-11-0043-02. This state license authorizes the operation of the low-level radioactive waste disposal site at Beatty, Nevada. License number 13-11-0043-02 is due to expire June 30, 1980.

The state of Nevada forwarded a copy of the renewal application to the State Programs Office (SP) of the Nuclear Regulatory Commission (NRC). By memo, dated June 3, 1980, SP asked the Waste Management Division (WM) staff to review and comment on the proposed renewal, by June 24, 1980.

This request was assigned to the Low-Level Waste Licensing Branch (LLW) for review. The LLW staff has reviewed the application submitted by NECO with the view in mind that a renewal application should be a self-supporting document that can stand alone and should reflect current state-of-the-art for the licensed activity.

Staff used its own technical judgements in its evaluation and also used experience gained and reflected in recent modifications of the operating licenses for the Washington and South Carolina sites. (NECO also operates the commercial site on the Hanford Reservation near Richland, Washington. Chem-Nuclear Systems, Inc. operates the Barnwell, South Carolina site.) In the discussion evaluating the Nevada renewal application, frequent cross references to these licenses are made. The intercomparisons and specific references were made to foster consistency and compatibility among the licenses for the three operating sites. This approach takes advantage of the collective experiences and minimizes the number of specifications facing waste generators and shippers.

8007170 668

Due to the short comment period, the low-level waste licensing staff has reviewed the material submitted by NECO as if it were a preacceptance review of an application. Deficiencies and possible solutions are discussed. The discussion is divided into:

- Site Suitability and Design
- Waste Form
- Waste Receipt
- Site Operations
- Environmental Monitoring and Surveillance
- Accident Analysis
- Site Closure and Stabilization
- Summary

Time did not permit preparation of a health and safety or environmental assessment.

A summary of the findings is presented followed by more detailed discussion of each topic.

SUMMARY

The NECO renewal application was reviewed in its entirety with the view in mind that a renewal application should be a complete document that reflects current state-of-the-art for the licensed activity. The most detailed aspect of the evaluation was to review each of NECO's proposed license conditions and note any changes or additions needed to reflect the current programs at the Washington and South Carolina sites. If Nevada adopts NECO's proposed conditions with the modifications indicated, a reasonable interim program is defined for waste form, waste receipt and handling, operations and environmental monitoring and surveillance. The deficiencies in the application are integral parts of the information base needed to meet suggested license conditions to develop site closure and stabilization plans, an operational reassessment, and an operations manual. The discussion which led to this conclusion was divided into the following areas: site suitability and design, waste form, waste receipt, site operations, environmental monitoring and surveillance, accident analysis, and site closure and stabilization.

Site Suitability and Design - Assuming the initial site evaluation and data are still valid, no geological or hydrologic reasons preclude continued operation of the site. The lack of up-to-date information on the site, failure to document and use 18 years of operational, geotechnical and environmental data and experience, and failure to develop technical specifications of planned site design are the most significant shortcomings of the renewal application. These pieces are also an integral part of site closure and stabilization planning. The requirement reflected in the site closure and stabilization section for a reassessment of operating activities to enhance site closure is also dependent on thoughtful, technically sound planning of disposal operations based on all available data. A significant

effort on the part of the applicant is required to provide documentation, site reassessment, and design specification.

Waste Form - It is important that waste form and content requirements are not less restrictive than and are as consistent as possible with the license conditions at the other burial facilities. Consistency will make it easier for the waste generators and shippers. Activities or requirements can be specified in more detail provided consistency is maintained. Waste form and content is addressed extensively in NECO's proposed license conditions. The more important areas where changes or additions are needed include a consistent TRU definition, a cutoff date for receipt of liquid scintillation wastes, a more realistic requirement for no free standing liquids in wastes, and a commitment to future solidification of resins and filter media. Review of proposed and supplemental license conditions on wastes and waste form indicates that all key issues can be addressed through license conditions without further information from the applicant.

Waste Receipt - Waste receipt, acceptance, and inspection requirements are specified in a fair amount of detail in NECO's proposed license conditions. A few modifications and supplemental specifications would improve the waste receipt program and incorporate improvements reflected in the Washington license. Facilities to open packages to check on waste and waste form must be planned and put into service. NRC guidance on operator sampling under development will be important to this planning. Commitment to such a facility and site operator inspection of wastes is important and should be in license conditions but should not delay renewal. The renewal application also suggests that a specific facility for overpacking is being planned. These plans should also be reflected in the renewal license conditions. The additional written procedures (e.g., surveying incoming vehicles

and handling damaged packages) needed are important but the improved health physics coverage imposed by suggested license conditions can compensate while they are developed. Improved waste inventory matters are not of immediate health and safety significance but are important to current and future planning.

Site Operations - For the purposes of this review, the site operations discussion includes administrative procedures, management controls, facilities and equipment, and training and experience, and burial operations. Corporate philosophy and guidance for establishing procedures and programs is established in the Radiological Controls and Safety for Burial Site Manual, a document already accepted for the Washington and Sheffield sites. The Work Procedures submitted are an acceptable beginning for developing a site operations manual. Having a site operations manual with up-to-date information for reference use by and training for employees is essential. The document should be developed to reflect the license conditions as proposed and modified, site operational experience, site utilization planning, technical specifications, and reassessment efforts.

Supplemental corporate management audits to cover site operations and activities not directly related to radiological safety are needed and license conditions are specified to cover this need.

The generic training requirements and training and experience of personnel filling the key positions appear acceptable.

Facilities and equipment are not explicitly described except for radiation detection equipment. NECO's procedures suggest use of most essential equipment and facilities except for damaged waste handling and inspection as discussed above.

NECO's proposed conditions and procedures cover burial operations but need changes and additions. Some of the more important changes are: a larger buffer zone around the burial area, thicker caps, greater segregation of chelating agents, and deeper burial of highly radioactive shipments. Proposed license conditions address these issues and can be used to define an adequate interim program pending reassessment against the site closure and stabilization plan.

Environmental Monitoring and Surveillance - The necessity, approach, and requirements for multi-media sampling are specifically addressed in NECO's application. However, without the information on the operational history as outlined in the site suitability and design sections, confirmation that the environmental monitoring program is based on a sound rationale and is adequate from a media and sample frequency point of view is impossible. If supplemental site information should warrant, sampling points and frequencies could be specified in later license conditions. Based on information in hand and that for an arid site, the subsurface monitoring effort can be minimal, the program does not appear unreasonable. Requirements for site surveillance can be addressed by the recommended license conditions to improve site and personnel surveillance programs and generate records for site closure, stabilization, and long-term planning.

Accidents - No accident analysis was submitted but accident analysis is not expected to have major impacts on planning or operations. The receipt and handling of solid waste materials is not expected to result in significant releases and current operations should already be based on 18 years of operational experience with similar wastes.

Site Closure and Stabilization - NECO explicitly addresses site closure and stabilization but omits the following important aspects: continuing operator responsibility, existing objectives, funding, and the need for a comprehensive plan. The shortcomings can be remedied by recommended license conditions. Site closure and stabilization requirements are at the heart of the design and operation of the site and are probably the most important conditions to upgrade at this time.

If NECO submits the products called for in the recommended conditions over the next six months and it represents a sincere and technically sound and well documented effort, the license can be modified to reflect the operational experience, site utilization and closure plans, site reassessment, and the new operational manual. If the information is not a quality product timely filed, formal action can be considered at that time.

Notes: We are enclosing two documents that will provide guidance for the applicant. These documents are the draft chapter outline, Standard Format and Content of Safety and Environmental Report for Low-Level Waste Disposal Facilities, and the draft low-level waste regulation Part 61. We realize that portions of these documents will not pertain to an operating site, such as pre-operational impacts, and that much of the operational matters are addressed by license conditions and existing procedures. However, these documents do outline our current thinking concerning what information is needed to adequately describe and define a low-level waste site and its operations.

Our review has not included any consideration of the financial status of the

operator or the adequacy of the long-term care financial planning. We assume these issues are being addressed separately as part of the lease arrangement.

We also assume that Nevada will consider NECO's inspection history and that any problem areas have been resolved and measures to assure continued resolution are covered by license conditions and procedures. We were not able to factor into our evaluation continued plans for on-site state inspectors and the concomitant assurances.

SITE SUITABILITY AND DESIGN

A cursory review was performed of the geologic and hydrologic characteristics of the site. The review was based on Attachment F, (a 1962 report submitted in support of the initial application) and some basic knowledge of the general geology and hydrology of that part of Nevada.

Geologic history of the site does not indicate that there are any active processes occurring that could adversely affect the site in the foreseeable future. Such processes as erosion or deposition do not appear to be actively modifying the land forms. Although the site is in a relatively active seismic area, faulting that could cause exposure of the wastes or create preferential pathways for waste migration does not appear likely. There is no indication, in the information reviewed, of recent faulting in the upper strata.

There are no streams of any significant size in the area that could cause flooding of the site. Local cloudbursts could result in surface runoff on the site, but the natural slope of the site is relatively flat and should result, at most, in only minor surface erosion. Ground water at the site is very deep with little or no infiltration since rainfall does not normally reach the aquifer.

Accordingly, based on this limited review, there does not appear to be any geologic or hydrologic factors that would adversely affect the ability of the site to contain the wastes.

Site design is addressed only by a few scattered operational references to topics such as buffer zones and trench caps. No comprehensive plan based on site characteristics, efficient use of disposal areas, or operational experience is presented. No technical specifications are provided.

A prudent review of the site suitability and design of the Beatty site should be based on the following supplemental information:

- a. A summary of the eighteen (18) years of site monitoring data and other data sources, including:
 - estimates of effluents
 - precipitation, wind, temperature data and other climatological data
 - soil moisture levels, including seasonal variations
 - erosion (both wind and water)
 - discussion of chemical waste site-address disposal of liquids, location of trenches in relation to the LLW trenches, and potential for interaction of chemical and low-level wastes.

- b. A summary of geotechnical engineering at the site, including:
 - trench design, properties of soil and backfill materials and trench excavation techniques
 - stratigraphic information for trench excavations-confirmation with (or lack of) the original assumptions
 - waste emplacement, trench compaction, and trench capping techniques
 - surface grading, erosion control, site layout and design
 - summary of trench subsidence and required maintenance/repair work.

- c. A site utilization plan that takes into account the best current understandings of the site, projections of the characteristics and volumes of past and future wastes, the site layout and design referenced in b. above,

trench volumes, and operational limitations such as segregation of chelated wastes or large quantities as discussed in the operations section. Such a plan would define the expected operation of the site over its useful life.

The lack of up-to-date information on the site, failure to document and use of 18 years of operational, geotechnical and environmental data and experience, and failure to develop technical specifications of planned site design are the most significant shortcomings of the renewal application. These pieces are also an integral part of site closure and stabilization planning. The requirement reflected in the site closure and stabilization section for a reassessment of operating activities to enhance site closure is also dependent on thoughtful, technically sound planning of disposal operations based on all available data. Certain of the specific practices that should reflect experiences gained through the Washington renewal are addressed in the operations section but a significant effort on the part of the applicant is required to provide documentation, site reassessment, and design specification.

WASTE FORM

It is important that waste form and content requirements are not less restrictive than and are as consistent as possible with the license conditions at the other burial facilities. Consistency will make it easier for the waste generators and shippers. Activities or requirements can be specified in more detail which could be helpful and reflect NECO's administrative requirements, provided consistency is maintained. Waste form and content is addressed extensively in NECO's proposed license conditions.

Sections 3.1 to 3.6 defining waste possession limits appear reasonable and consistent with the other site requirements and/or existing license conditions with one exception: the half life for transuranics in 3.1 and 3.4.1. Please note, the definition of transuranic (TRU) stated by Waste Management in notice of proposed rule making published in the Federal Register, May 13, 1980: "Transuranic wastes" or "TRU wastes" - means radioactive waste containing alpha emitting transuranic elements, with radioactive half-lives greater than one year, in excess of 10 nanocuries per gram." If half-lives are to be addressed in the license condition one year rather than 100 years should be used.

The one curie limit for radium sources in the existing license was dropped from the possession limit section. Note that South Carolina has barred discrete radium sources and most wastes containing radium at the Barnwell site. (See Condition 59 on Amendment No. 27.) A similar limit at the Beatty site seems a prudent move and would be in line with restricting Plutonium and other transuranic material disposal.

In Section 4.4 of NECO's license conditions, records of evaluations of non-radiological hazards of the waste are to be kept for three years. Such information

might be useful for planning corrective measures, should they be required, and for planning long-term care and should be retained indefinitely and turned over to the long-term care custodian.

The packaging requirements for liquid scintillation wastes in Section 4.5 are more detailed but generally consistent with requirements in the Washington license. However, keeping pressure on generators to develop better disposal methods for liquid scintillation wastes is extremely important. Imposing a specific cutoff date will help foster the development of alternatives. For example in the Washington license liquid scintillation wastes may be received until December 31, 1982. In the Washington license, use of absorbents approved by the Department of Social and Health Services is required. In 4.5.4, NECO specifies examples of absorbents and prohibits Vermiculite. In our letter to Mr. T.R. Strong dated April 8, 1980 (copy enclosed), we recommended absorbents for different materials based on information from NECO. The April 8, 1980 letter specifically recommended:

- For absorbed liquids:
 - Perlite (medium grade)
 - Diatomaceous earth (medium grade)
 - Pe1-L-Cel
 - Super Fine (Diatomite)
 - Speedi Dry
- For scintillation vials:
 - Perlite (medium grade)
 - Diatomaceous earth (medium grade)
 - Super Fine (Diatomite)
 - Speedi Dry
- For animal carcasses:
 - Perlite (medium grade)
 - Diatomaceous earth (medium grade)
 - Super Fine (Diatomite)
 - Speedi Dry

The renewal license conditions should specify use of these absorbents with the indicated materials or, to avoid amendments, the use of absorbents approved by the State should be specified.

Section 4.6 which addresses biological materials is consistent with the Washington license except that the Washington license requires that "after April 1, 1980 a refrigerated van shall be used to ship biological waste if the transit time will exceed 48 hours from the time the biological or animal carcasses are first removed from cold storage until arrival at the disposal site." The refrigeration requirement provides an additional measure to control problems with pressure buildup and leakage from decay that you should consider.

Section 4.7 addresses unpackaged (bulk) wastes. Disposal of bulk wastes requires special approval in the Barnwell licenses. The requirements concerning water and wind dispersion, presence of liquids such as oil or water, and prohibiting sludges appear to address the problem areas. You may wish to require State approval so you are aware of nuclide content and unusual shipments.

Section 4.8 defines free standing liquids and indicates a "no detectable free standing liquid requirement." After consultation with industry, we are convinced that a zero criterion is beyond the present state-of-the-art. Washington and South Carolina have adopted a more realistic requirement: "No free standing liquid shall be defined as less than 1% liquid by volume until December 31, 1980. Effective January 1, 1981, no detectable free standing liquid shall be defined as trace quantities (not more than 0.5% or one gallon per container, whichever is less)."

Section 4.9 requires at least one metal band on wooden boxes. We suggest this requirement be expanded along the lines of Condition 27(g) of the Washington license:

- (g) Waste packages must be without significant package deformation, loss or dispersal of the package contents, or an increase in the maximum radiation levels recorded or calculated at the external surface of the package. Effective March 31, 1980, and except for overpacks which are removed prior to burial, cardboard, fiberboard, and paper packages are prohibited. All wooden boxes shall be banded with metal bands. Void spaces within the packing container should be minimized.

The problems with wooden boxes are still under evaluation. The April 8, 1980 letter to T.R. Strong addressed the box problem as well as absorbents. Interim guidance was provided in Enclosure 1 to the letter and cooperation in adding to the data base was requested.

The Washington license contains additional conditions not included in NECO's recommendations. For example, Condition 27(e) specifies acceptable solidification media for liquids and sludges based on South Carolina's evaluations and specifications. Dow media, cement, urea-formaldehyde, asphalt, Delaware custom media, and others subsequently approved are specified.

Washington and South Carolina are committed to solidification of resins and filter media when the capability exists. This commitment is reflected in Condition 27(k) as follows:

- (k) Ion exchange resins and filter media may be received in a dewatered form for transportation and subsequent burial until June 30, 1981 and shall contain no detectable free standing liquids. After June 30, 1981, resins and filter media containing radioactive material having a total specific activity of 1 uCi/cc or greater of materials with half-lives greater than 5 years must be stabilized by solidification.

Adoption of this position in the Beatty license will provide the necessary impetus

to assure that waste generators develop the necessary capability.

The Washington and South Carolina licenses have a 1% limit for contained oil. (e.g. See Condition 26 on the Washington license*.) The proposed NECO conditions do mention oil in Section 4.7 on bulk unpackaged wastes, so the issue is at least raised. The problem with solidifying or using absorbents with oil is that no effective products have been demonstrated as yet. A future requirement spelled out in the licenses keeps industry attention focused on the problem.

NECO addressed storage of wastes at the site in Section 7.0. Two minor points Nevada may wish to consider are 1) clarify the wording in 7.5 to insert after storage, "as provided for in Sections 7.1 to 7.4" so that longer or different interim storage is not implied and 2) impose reduced possession limits for storage. The fifteen day limit for storage without case-by-case approval minimizes the need for the reduced possession limit. Fire or other accident scenarios suggest keeping storage to a minimum and this approach is indicated. Section 8.8 of NECO's proposed conditions conflicts with Section 7 and the definition of disposal is poor. Deleting Section 8.8 would alleviate two problems.

*Condition 26 of Washington License - 26. After December 31, 1980, radioactive waste containing more than one (1) percent oil by volume shall be either solidified as specified in 27(a), or absorbed with a quantity of absorbent material capable of absorbing twice the total volume of oil to be absorbed. The waste container shall be restricted to a DOT 17H specification container or equivalent, and it shall be lined with a minimum 4 mill plastic liner which shall be sealed. Only absorbents approved by the Department shall be used.

Review of proposed and supplemental license conditions on wastes and waste form indicates that all key issues can be addressed through license conditions without further information from the applicant.

WASTE RECEIPT

Waste receipt, acceptance, and inspection requirements are specified in a fair amount of detail in NECO's proposed license conditions in Section 5. A few modifications and supplemental specifications would improve the waste receipt program and incorporate improvements reflected in the Washington license.

Section 5.1 outlines problem conditions with shipments which will require notification of Nevada officials. Two points are questionable. One is specification of what other action, such as suspending processing of the shipment until directed by the State, will be taken. The second relates to the language that shipments will be accepted that are in unacceptable forms (Section 5.1.3) or are from embargoed shippers. Section 5.2 outlines a prior acceptance check program. Section 5.1 should reflect this concept. Section 5.2 also contains unacceptably vague language. In 5.2.2, a "representative" radiological survey is discussed. License Condition No. 31 of WN-1019-2 and the referenced Appendix B were designed to address a similar lack of specificity. Condition 31 states:

31. Surveys of incoming vehicles shall be conducted in accordance with conditions set forth in Appendix B of this license. Surveys also shall be conducted during off-loading and handling operations to assess radiation and contamination levels and to identify problem situations. Vehicles shall be surveyed before release to determine compliance with DOT, NRC, and license requirements. Maximum radiation levels detected in all surveys shall be documented and records maintained for inspection. The requirements set forth in Appendix B are intended to define minimum requirements and are not meant to limit survey activities.

Section 5.2.3 requires inspection of packages to determine compliance with possession limits in Section 3.0. No reference to checking packaging and waste form as specified in Section 4.0 was included. Condition 32 of the Washington license states:

32. The licensee shall maintain the capability for safely opening and inspecting the contents of waste packages received at the site, and overpacking damaged or leaking waste packages as required for disposal or return to shipper.

The type of quality assurance program needed is part of followup technical assistance NRC is providing Washington. The commitment to plan and build facilities and equipment is important. Washington and NECO are still negotiating the detailed implementation of package opening. A license condition requiring submission of a schedule for implementation would acknowledge the need. In NRC's cover letter on an essentially identical license Condition, the following direction was given:

With respect to Condition 13, unless otherwise directed or authorized by NRC, inspection of waste packages containing special nuclear material should at present be limited to visual examination. Damaged or leaking waste packages should be overpacked as directed or authorized. Please contact us in the near future regarding your submission of a plan for your routinely opening and inspecting the contents of waste packages selected randomly from incoming waste shipments, and repackaging the package contents as required. This plan shall include equipment and instrumentation; ventilated facilities with provisions for collecting, solidifying, and disposing any free liquids (or other contamination) removed from the waste packages; procedures; sampling decision factors and frequency; and a schedule for achieving the inspection program.

We will advise you when NRC guidance on designing a sampling program is finalized. Washington and South Carolina also limit the times that the operator can open packages. Condition 21 from the Washington license illustrates:

21. Unless otherwise specifically authorized by the Department, the licensee is not authorized to open any package containing radioactive material at the facility, except for the following:
 - (a) For purposes of repairing, repackaging, or overpacking leaking containers or containers damaged in transport in the event the material is to be disposed of and if required for the protection of the health and safety of the employees.
 - (b) For purposes of inspection in the presence of a state inspector for compliance with the Washington rules and regulations for radiation protection and conditions of this license.
 - (c) For purposes of returning outer shipping containers; and
 - (d) For purposes of retrieving shipping documents.

The reference to NRC approved analytical methods in 5.4 is unclear unless the procedures are those approved in the NRC license for the specific operation. See earlier comment about TRU under the Waste section also.

The waste receipt conditions outlined do not address applicable requirements for receipt of damaged packages. Specifically, Condition 33 of Washington's license states:

33. In the event that significant package deformation, loss or dispersal of package contents, or packages with maximum radiation levels in excess of DOT, NRC or State regulations are observed during waste receipt or an unloading operation, that operation shall be terminated. Appropriate safety measures as outlined in the Site Operations Manual or the Radiation Control Manual shall be instituted followed by notification to the department of the incident and a description of the problem areas.

The customer shipping the waste shall be advised of the situation and given 24 hours to send a representative to inspect the shipment. After 24 hours, or if an inspection is waived by the customer, and with approval of the Department, the shipment in violation shall be either off-loaded from transport vehicles and overpacked prior to disposal, or be returned to the shipper, provided that return of the shipment would not be in violation of DOT regulations. Shipments in violation of placarding, labeling or bracing requirements shall be off-loaded and disposed of. Future receipt of waste at the site from shippers in violation may be prohibited until corrective actions satisfactory to the Department and NRC have been taken.

NECO does not have a Radiation Control Manual or specific procedures to reference in paragraph one. The last sentence can be deleted or adapted to meet Nevada's embargo requirements and should not reference NRC since no NRC license is in effect.

Records concerning all waste shipments are vital to future planning for the site. Conditions 15, 16, and 17 of the Washington license address the key issues. The

conditions read as follows:

15. A monthly site receipt and burial activities report shall be submitted by the licensee, no later than the 10th day of the following month, to the Supervisor, Radiation Control Program, DSHS - Health Services Division, M.S. LD-11, Olympia, Washington 98504. The report shall include but not be limited to the following information:
 - a. name and address of the shipper;
 - b. radionuclides and activity of each radionuclide in millicuries;
 - c. type and physical form of the waste (e.g., solidified liquids, compressed paper, etc.);
 - d. chemical form of the waste and solidification agent;
 - e. grams and total volume of special nuclear material as received under NRC license no. 16-19204-01; and
 - f. kilograms and volume of source material received.
16. Upon the adoption by the Department of a State of Washington Radioactive Materials Shipment Record (RSR) form, the licensee shall furnish copies of all RSR forms received during the monthly period covered in the report as an attachment to the monthly site receipt and burial activities report.
17. The licensee shall maintain all records pertinent to the receipt and burial of radioactive material at the Richland site unless authorization has been given by the Department to transfer or dispose of the records.

Condition 15 needs to be modified to reference Nevada and delete reference to NRC in item e. The upon adoption clause can probably be deleted from 16. Condition 17 should reference the Beatty site. Sections 5.7, 5.9 and 5.10 of NECO's proposed conditions address the same issues. Section 5.9 outlines a reasonable management certification and documentation. Section 5.7 would be effectively replaced by adopting 15 above. The major difference is data on individual nuclides. NECO may need time to comply if automatic data processing is not available. Shipping records can provide a data base in the interim. The maintenance of records is so important to closure and stabilization and long-term care that the inconveniences are warranted.

The difficiencies and problems concerning waste receipt can be addressed in large part by additional or modified license conditions. The needs which cannot be completely addressed are:

1. planning for facilities and a program for inspecting the contents of packages,
2. written procedures for handling damaged packages, and
3. data processing the information on shipping records, particularly for individual nuclides.

These items can be addressed in that planning and implementation can be required in license conditions.

SITE OPERATIONS

For the purposes of this review, the site operations discussion includes administrative procedures, management controls, facilities and equipment, and training and experience, and burial operations.

Administrative Procedures

The renewal application submitted by NECO included the Radiological Controls and Safety for Burial Site Manual containing the corporate philosophy of how a site should be run. This information has been previously submitted and accepted for the Washington and Sheffield sites. Time did not permit line-by-line review, but the changes in the revised version do not appear significant. This document outlines key areas and options for dealing with each area. It establishes the requirement to develop programs at each site for matters such as environmental monitoring, security, etc. For the most part actual enforceable programs are developed pursuant to the document.

The license renewal application did not include a site operations manual, per se. Instead, the applicant has proposed license conditions and work procedures that would normally represent a major portion of a site operations manual. Although the proposed license conditions are clear and concise statements, they do not supply sufficient detail to substitute for a working site operations manual. From a licensing point of view, two points are important.

One point is that all principle requirements should be reflected explicitly in the license itself - NECO's approach does result in requirements being spelled out in the license for many areas but implementing procedures should normally be too detailed for many aspects of site operations. Very explicit requirements on waste, waste form, and packaging provide a means of advising waste generators

and shippers. Procedures developed to implement license requirements should reflect the requirements not establish them. The second point is that the development of detailed procedures that consolidates requirements from the license, regulations, and corporate preferences serves a dual purpose: a useful reference document so the operator knows what procedures to follow and a demonstration that the applicant can develop and consolidate all the various requirements.

A site operations manual is a working document, easily updated, that is readily available to each employee for their own use and is used as a reference during training sessions. The document should have subjects indexed for quick and easy reference, describing in detail topics such as the following:

- organizational structure
- package receipt and handling procedures
- trench construction and maintenance
- personnel monitoring procedures
- environmental monitoring procedures
- action levels and actions to be taken
- contamination monitoring procedures
- personnel training
- decontamination procedures
- instrument calibration
- emergency planning and agreements
- support facilities
- auxillary systems
- personnel responsibilities
- waste segregation and emplacement
- management audits
- record keeping
- surveys
- security
- quality control

The work procedures proposed by the applicant already address many of these topics. This effort needs to be completed and consolidated and worksheets, standard forms,

etc. included. NECO indicated in its cover letter that additional procedures to cover emergencies, training, and respiratory equipment would be submitted before July 1, 1980. Procedures for new requirements such as site surveillance will be needed to implement the requirements in the license conditions recommended in the environmental monitoring and surveillance discussion. Modification will be needed to implement the technical site development plan when finalized and approved. These points confirm the need to have a flexible document and an up-to-date reference.

Revisions to manuals, procedures, or facilities are addressed by NECO in proposed conditions in Section 11. The referenced changes apply only to the policy manual, Radiological Control and Safety Manual. The operator is given greater flexibility at the Washington site in Condition 14, as follows:

14. Changes, Tests, and Experiments:

- a) The licensee may, upon notification to the Department but without prior Departmental approval, and subject to the provisions of subparagraph (b) below:
 - i) Make changes in the disposal facility described in the application;
 - ii) Make minor changes in the procedures described in the "Radiological Control and Safety for Burial Sites Manual" (Radiological Controls Manual) and "Site Operations Manual for Low-Level Radioactive Waste Disposal at Richland, Washington" (Site Operations Manual);
 - iii) Conduct tests or experiments not described in the application.
- b) Prior Department approval is required if the proposed change, test, or experiment:
 - i) Involves a change in a license condition other than Condition No. 14(a)(ii);
 - ii) Involves a reduction in the licensee's record keeping and reporting requirements;

- iii) Increases the potential for release of radioactive material to unrestricted areas or otherwise causes a potential decrease in the protection of the health and safety of individuals in unrestricted areas, now or in the future; or
 - iv) Increases the potential for radiological exposure to site personnel, or otherwise causes a potential decrease in operational safety.
- c. The licensee shall maintain a record of changes in the disposal facility and of changes in procedures made pursuant to this condition. Records of tests and experiments carried out pursuant to subparagraph (a) of this condition shall also be maintained. These records shall include safety evaluations which provide the bases for the determination that the changes, tests, or experiments do not involve conditions described in subparagraph (b) above. The licensee shall furnish the Department, within 30 days following the changes, tests, or experiments a report containing a description of such changes, tests, or experiments, including a summary of the safety evaluation of each.

NECO refelected the basic criteria in proposed wording in 11.2 but omitted the provisions of 14(c) of the Washington license. Keeping the regulatory authorities informed and documenting decisions are important and (c) should be included.

Management Controls

The renewal application for the Nevada site includes audits of the Corporate Chief Radiological Control and Safety Officer. See, for example, Section 4 of the Radiological Controls Manual. However, these audits are directed at the radiological safety aspects of the site activities and do not address the overall site operations. The Washington site operations manual included some general requirements for corporate audits to cover areas in addition to radiological safety. These types of audits are important, particularly in view of the remoteness of the site from the headquarters in Louisville.

Conditions 18, 19, and 20 were included in the Washington license to define a more comprehensive audit program. These conditions state:

18. The licensee's corporate management audit program, described in Section 2.1.3 of the Site Operations Manual, shall be expanded to require comprehensive management audits of those site activities and requirements of the license which are not specifically listed in Section 4.0 of the Radiological Controls Manual and assigned thereby to the Chief Radiological and Control Safety Officer. These audits shall include, but not be limited to, audits of trench filling methods and inspection of shipping records, certifications, and incoming packages and containers. Comprehensive management audits will be made at least once in each calendar quarter and will include a direct observation of receipt, inspection, and burial of waste materials over a two work-day period. In addition, at least one unannounced site inspection shall be conducted by management every six (6) months. Audit information, inspection findings and corrective measures shall be documented.
19. The corporate management audits described above shall be made by an individual, or by individuals, other than the official designated as the corporate Chief Radiological Control and Safety Officer.
20. The site manager shall conduct and document a weekly inspection of the operating checklists and conduct a random sampling of supporting documents to verify that they are being completed properly.

The reference to Section 2.1.3 in lines 1 and 2 should be deleted from Condition 18 before adopting the condition for the Nevada license. The remaining requirements would apply. Condition 19 adds an independent check to the audit program. Condition 20 requires positive action on the part of the site manager which would re-enforce the responsibility defined in paragraph 2, Section 6.1 of NECO's proposed conditions. Section 5.5 of NECO's proposal requires submission of audit reports and is a good idea. Management audits might also be of interest to Nevada.

Training and Experience

Section 6 of NECO's proposed license conditions addresses the qualifications and responsibilities of key personnel. The generic qualifications appear adequate and if management emphasis and audits are directed toward total site operations as

reflected in the suggested additional conditions in the preceding section, the responsibilities appear reasonable. The personnel on board appear reasonable.

Facilities and Equipment

The renewal application did not include a description of the existing facilities at the site. Section 10 of the proposed license conditions discusses a plan to remove the old solidification facilities and to establish a decontamination and repackaging facility. As discussed earlier under Waste Receipt, a facility for opening and inspecting packages should also be planned.

The renewal application includes a cryptic listing of radiation detection instruments (Attachment C). Information on the capabilities and use must be gleaned from Work Procedure BN-002 for the gas flow proportional counter NMS DS-3P and the survey procedures in Work Procedure BN-004.

Other equipment is referenced only in procedures calling for its use. For example, air sampling using fixed and portable instruments is specified in BN-004. One minor point noted is that no air flow calibration methods are included in BN-004. References to such equipment are usually to a specific model "or equivalent." Protective clothing and equipment, emergency supplies, decontamination equipment are similarly in procedures but not specified as on hand. Operating equipment such as cranes or earthmoving equipment is mentioned only in the procedures. NECO could establish minimum equipment requirements even if some of the equipment is moved from site to site.

Burial Operations

Section 8.0 outlines NECO's proposed operational conditions. Condition 8.2-8.4

relate to trench locations. Condition 8.2 specifies a site buffer zone of only 10 feet. Buffer zones should be at least 100 feet to provide space for corrective measures which might be necessary in the future. Ten feet between trenches is acceptable if geotechnically sound. The requirement for engineering survey is important in 8.4. Eventhough a technical site development plan should be developed, as built trench location determinations are necessary and the requirement retained. Section 8.6 specifies 3 feet of earth cover and a maximum of 2 foot mounds. This cover may not provide the long-term protection from intruders (animal or human), deep rooted plants, and erosion that the minimum of 8 feet provides for trenches at the Washington site. Condition 37 of the Washington license requires:

37. Excluding trenches 1 through 6, a minimum of eight feet of earth (compacted where possible) shall separate the radioactive wastes and the natural grade level of the trench opening. After final grading, the top of the trench shall be maintained at the natural grade level of the land prior to excavation.

Whether the above grade mounding at the Nevada site continues depends on an evaluation of the wind erosion potential. The Washington license also requires a rock cover to control erosion in Condition 35:

35. Open burial trenches, until filled and capped, shall be surrounded by a chain link fence, eight feet high, and topped with barbed wire. Those trenches which have been filled and capped may be surrounded by a barbed wire fence. Filled and capped burial trenches shall be completely covered with at least six inches of large gravel and rock which shall extend at least ten feet beyond the edges of the trench. After capping, trenches shall be marked with a monument inscribed with the following information:
 - (a) Total activity of radioactive material, in Curies, excluding source and special nuclear materials; total amount of source material in kilograms; and total amount of special nuclear material, in grams, in the trench;
 - (b) Date of filling and capping the trench; and
 - (c) Volume of waste in the trench.

Operating experience over the last 18 years should be factored in a decision on the requirements for rock cover but not depth of burial.

Condition 8.11 of NECO's proposals addresses segregation of wastes containing chelating agents. The 1% chelate content criterion is consistent with the Washington license but the isolation parameters are not. Condition 34 of the Washington license states:

34. Wastes containing chelating agents in packages amounts greater than 1% of package volume shall be segregated from other wastes, stored separately, and be disposed of either in separate trenches or in specifically segregated areas within an existing trench, and isolated from other wastes with 10 feet of soil.

Thus NECO's 3 foot requirement should be increased to 10 and the separation from scintillation materials deleted. The major concern for chelates and scintillation wastes is mobilization of other, usually more radioactive, wastes. Scintillation wastes are usually of low activity and the chemical mix is not of major concern.

Section 8.12 of NECO's proposed conditions specifies when wastes containers can be selectively stacked based on radiation levels. This is a good approach, but NECO could be asked to evaluate other measures or procedures that could be used to ensure that all trenches are used in the most efficient manner consistent with good radiation safety practices.

The 100 mrem/hr exposure levels at the edge of the trenches specified in Section 8.13 are high but must be viewed in terms of staff working times in the area and maximum efficiency in use of space (i.e. excessive backfilling). A daily survey might be acceptable if no wastes are received or handled but would not be acceptable during operations. Radiation staff should be monitoring operations constantly and the working area should be included.

Condition 8.14 of NECO's proposal outlines the generic requirements for surveying vehicles. Work Procedure BN-004 provides supporting details for all types of survey activities. In keeping with an approach that all important requirements be specified in the license, license conditions should be added to address all types of surveys. Based on a cursory review the survey program in BN-004 seems to have a reasonable basis and uses NRC Regulatory Guide 8.21 on survey programs. The requirements could be more specific to Beatty operations and in a more concise form for better reference. Two minor points were noted in our quick review. On page 6, use of respirators is called for if action levels are exceeded but no mention is made of how much the levels can be exceeded before total evacuation is required based on equipment protection factors. (We note that procedures for respiratory equipment use are promised in NECO'S cover letter.) The air monitoring program does not include iodines, only particulates. The second point concerns setting action levels in CPM rather than DPM. Directions to workers should be in CPM if that's what the instrument reads but policy should be DPM. One editorial note concerns the tone that the operator will do this or that. A comprehensive program should already be in place. In the Washington license renewal review, a concern for minimum specifications for surveys was addressed by Condition 46* and the referenced Appendix B. You may want to adopt similar requirements since the vehicle requirements are general. NECO does have action levels that are consistent with those at Washington and South Carolina as far as they go. However Section II of Appendix A of the Washington license has a more complete list.

*Condition 46 is quoted in the Environmental Monitoring and Surveillance section.

Condition 8.16 of NECO's proposed conditions requires that trained Radiological Control Personnel be present at the operational trench during all disposal operations. The fact that the control personnel may also perform other jobs, such as operate the crane, prompted Condition 42 on the Washington license:

42. During any disposal, decontamination, or overpacking operation, an employee whose sole responsibility is that of surveying, monitoring and recording radiation levels, and correlating waste packages with information contained in the shipment manifest documents shall be present. This employee shall be appropriately equipped with calibrated and operable survey and detection instruments in accordance with Condition 43.

The only comment on the Security provisions in Section 9 of NECO's conditions is the future tone. We assume these measures are in place now. If not, time limits should be imposed. A month should be sufficient for any not in place.

As discussed in the previous section outlining the need for a site operations manual, specific written procedures are very important. Condition 41 of the Washington license addressed this need for operations:

41. Waste handling and disposal operations shall be conducted according to specific written procedures and site criteria promulgated by the licensee. At a minimum, procedures shall be written for (a) overpacking operations, (b) decontamination operations, including packaging and disposal of removed contamination, and (c) handling and disposal of radioactive waste material, including handling and disposal of solid low-activity waste, organic and biological waste, and high-gamma content waste requiring shielding.

Two comments: 1) Work Procedure BN-003 address high-gamma wastes and 2) such procedures will also depend on the site utilization and technical specifications. They can be developed now but will have to be revised.

Condition 36 of the Washington license outlines a performance objective that should also be considered at Beatty:

36. The licensee shall conduct operations in a manner which will minimize dispersal of excavated material and erosion of the filled and capped trenches by wind.

Wind may not be as much of a problem at Beatty. This is another area where the operational experience will be helpful.

An important area also not addressed by NECO is the need to bury the highly radioactive shipments at deeper depths. The additional depth provides additional assurances to protect potential intruders during the long-term care period. It may involve wells or deeper excavation in the usual trench bottom. The following clarifying rewrite of Condition 39 of the Washington license contains the essential requirements:

Type B quantities of waste material, or waste material having radiation readings, without shielding, in excess of 10 R/hr. at any package surface, must be disposed so that a minimum of 20 feet is maintained between the top of the waste and the top of the trench. Waste containing large quantities of radioactivity must be disposed so that a minimum of 30 feet is maintained between the top of the waste and the top of the trench. The intervening space between the top of the waste and the top of the trench may be filled with other waste received for disposal provided that the other conditions of this license are met.

The type B and large quantities are transportation designations and are specified in Part 71 of NRC's regulations, for example. The depth of the water table should pose no problems complying with this condition.

Condition 40 of the Washington license specifies conditions for protection of personnel. Condition 40 states:

40. Licensee personnel shall wear protective clothing (at a minimum, coveralls and gloves) at all times while handling or disposing of radioactive wastes. The licensee shall provide change rooms for the employees and maintain procedures for checking for contamination and for decontaminating personnel and clothing. In addition to the above, safety equipment (including respiratory equipment, fire extinguishers, and safety showers) must be provided and tested at least once every six months. Plans for meeting the conditions set forth in this section shall be submitted to the department for approval by July 1, 1980.

NECO's work procedures address checking employee contamination but not the other provisions. A month should be adequate time to provide plans.

Copies of the Washington and South Carolina licenses are enclosed for further reference.

ENVIRONMENTAL MONITORING AND SURVEILLANCE

The applicant addressed environmental monitoring in Section 9.0 of the "Radiological Control and Safety Manual" and in Radiological Control Work Procedure BN-008. The necessity, approach, and requirements for multi-media sampling are addressed. However, without the information on the operational history as outlined in the site suitability and design discussion, confirmation that the environmental monitoring program is based on a sound rationale and is adequate from a media and sample frequency point of view is impossible. If supplemental site information should warrant, sampling points and frequencies could be specified in license conditions as was done in Condition 44 of the Washington license to supersede those specified by NECO in the Work Procedure. Based on information in hand and that for an arid site, the subsurface monitoring effort can be minimal, the program does not appear unreasonable.

One detailed comment noted in our quick review concerns Section 4.2 Dry Well, of Attachment F, of NECO's application for renewal. Sampling should be conducted very near the bottom of the trench. The procedure here is based on 10 feet or greater separation between the waste and the sampling point. Since the migration rate is expected to be very slow a shorter distance is probably justified. The dry well should be installed to ensure that samples are taken below the lip of the well (The description did not specify where the samples are taken.). A second detailed comment noted is that soil samples should be taken from dust fallout areas such as at the base of plants.

NECO's proposed requirement to submit all environmental monitoring data in Condition 5.6 should be adopted.

An active site surveillance program is important to assure prompt attention to problems and to establish a data base on the types and frequencies of actions needed. The NECO proposed conditions are silent on this point. Conditions 46 and 47 of the Washington license were developed to impose site and personnel surveillance programs and generate records for the data base. Conditions 46 and 47 state:

46. The licensee shall conduct a site and personnel surveillance program to maintain contamination of skin, personal clothing, protective clothing, items for unconditional release, sole use vehicles, equipment, and site areas to levels as low as reasonably achievable. Contamination limits must be within those specified in Section II, of Appendix A, of this license. The licensee shall perform at least the minimum site radiological surveys listed in Section III, Appendix A, to determine compliance with the specified contamination limits. The results of the site survey shall be recorded on forms suitable for NECO management audits and state inspection. If decontamination operations are required to meet the limits of Section II, Appendix A, the survey record shall state the readings observed both prior to and after decontamination operations are complete. In addition, the licensee shall conduct at least the minimum personnel surveys listed in Section IV, Appendix A.
47. The licensee shall provide, at a minimum, a quarterly site inspection program and a site maintenance program to verify proper maintenance and upkeep of all fences, filled and capped trenches, caissons and all disposal areas. Records of inspections and maintenance shall be maintained and submitted with the stabilization plan for final site closure. The records are to include, but not be limited to:
 - (a) The date of the inspection.
 - (b) The name of the inspector.
 - (c) Identification of fences, trenches, caissons or other disposal areas which have been inspected.
 - (d) Identification and location (marked on a scaled map of the site) of fences, caissons, trenches, or other disposal areas needing repair. (For example, trenches needing repair would be those exhibiting erosion, shrinkage, subsidence, settling, cracking, gullyng, or loss or thinning of the gravel cap.) Maintenance of fences should include, but not be limited to clearing away tumbleweeds and/or drifting sand.

- (e) A graphic description of the condition requiring repair.
(For example, details such as the size and extent of cracks or the depth of any sunken areas.)
- (f) A description of the repairs made to the fence, trench, caisson, or disposal areas (including a list of time and materials required to make the repairs).

No modifications would be required for the Beatty site since both are arid sites and action levels should be similar.

ACCIDENT ANALYSIS

A discussion of the types of accidents that can occur in an operation provides input into restrictions on waste quantity or form, required facilities and equipment, operational planning, emergency planning, and assessment of possible environmental impacts. The renewal application does not address the potential for accidents, report accident experience to date, or attempt any numerical analysis.

Receipt and handling of the wastes at the site is not significantly different from transportation of the materials. Accidents are not of major significance in transporting all types of nuclear materials and receipt and handling of solid waste materials is not expected to lead to significant releases. The eventualities should be evaluated for the Beatty site.

Possible accidents and natural phenomena to be considered include, but are not necessarily limited to fires, floods, seismic phenomena, tornadoes, and handling accidents. Existing documents can be referenced provided the relevancy and applicability to the site are clearly shown and relevant document pages are provided.

SITE CLOSURE AND STABILIZATION

NECO explicitly addresses site closure and stabilization in Section 12.0 on page 18 of the proposed license conditions. The proposed conditions call for submittal of an outline of objectives by April 30, 1980, and a reassessment of current operating practices by November 30, 1980. The requirements outlined by NECO omit several important aspects of the site closure and stabilization conditions. The continuing operator responsibility is not acknowledged. Objectives for closure and stabilization have been established and adopted by NRC, South Carolina and Washington. See, for example, Condition 53 of South Carolina License No. 097. The NECO conditions ignore the funding aspects. The site closure and stabilization plan should be more than an outline. The licensee should be committed to existing generic objectives while a site specific plan is prepared.

The shortcomings outlined above can be remedied by adopting Conditions 52 - 57 of License No. 097 issued by South Carolina verbatim except that due dates should be changed. Six months to prepare a full plan and reassessment of site activities should be sufficient. For your convenience, Conditions 52 - 57 are quoted below:

52. As material buried may not be transferred by abandonment or otherwise, unless specifically authorized by the Department, the expiration date on this license applies only to the above ground activities and to authority to bury radioactive material wastes at the site specified in Condition No. 5. The license continues in effect and the responsibility and authority for possession of buried radioactive material wastes continues until the Department finds that the plan established for preparation of the Barnwell site for transfer to another person has been satisfactorily implemented in a manner to reasonably assure protection of the public health and safety and the Department takes action to terminate your responsibility and authority under this license. All requirements for environmental monitoring, site inspection, and maintenance, and site security continue whether wastes are being buried or not.
53. Site closure and stabilization of the licensee's facility shall be accomplished in accordance with the U. S. Nuclear Regulatory Commission's Low-Level Waste Branch Position entitled, "Low-Level Waste Burial Ground Site Closure and Stabilization," Revision 1 dated May 17, 1979. A copy of the performance objectives is attached.

54. Prior to May 31, 1980, a preliminary plan for preparation of the site for transfer to another person who would only passively hold the site shall be submitted for review. The plan shall be consistent with Condition 53. of this license and shall include demonstration that funds are being set aside or other measures being taken are adequate to finance the site closure plan. The plan shall also include preliminary estimates of costs, environmental impacts, data needs, personnel needs, material and equipment needs, planned documentation and quality assurance, and detailed plan for trench locations and elevations, expected capacities, planned surface contours, and buffer zones.
55. Prior to May 31, 1980, a reassessment of current operating practices shall be submitted. The reassessment shall consider the objectives of the site plan specified in the preceding paragraph and any changes in operation at the site which would enhance implementation of the plan.
56. The licensee shall submit an updated plan and operational assessment every five years for review.
57. One year prior to the anticipated transfer of the site and buried radioactive materials to another person (including an agency of the U.S. Government) the licensee shall submit a final version of the site preparation plan including a schedule for implementation of all remaining plan elements prior to transfer, and a description of the mechanics of orderly transfer in coordination with the transferee.

Enclosures:

1. Letter to T.R. Strong from R.D. Smith dated 4/08/80
2. Amendments No. 26 and 27 to South Carolina License No. 097
3. Amendment No. 11 to Washington License No. WN-1019-2
4. Standard Format and Content Outline
5. Draft Part 61 dated November 5, 1979