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State of Utah
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF RADIATION CONTROL

Michael O. Leavitt, Governor
Dianne R. Nielson, Ph.D., Executive Director
William J. Sinclair, Director

168 North 1950 West
P.O. Box 144850
Salt Lake City, Utah 84114-4850
(801) 536-4250 Voice
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March 28, 1997

Richard L. Bangart, Director
Office of State Programs
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Bangart:

As requested, the following information is being provided to assist you in responding to the letter from Dr. Carol Marcus, President of the California Chapter of the American College of Nuclear Physicians. We are answering the three questions in the order in which they were presented.

1. Ion exchange resin disposal was approved through changes in the Envirocare Operating Procedures Manual and Waste Management Plan (required by License Condition 51). These types of operational changes are routinely made by changing the plan and do not require a license amendment. We are providing a series of letters (attachment A) from Envirocare which initiated the approval process. Envirocare believed that no approval process was necessary because of existing license requirements. The Division disagreed with this assertion and subjected the resins disposal proposal to a technical review and approval process. The process consisted of an exchange of a number of letters and interrogatories concerning technical issues regarding resin disposal. We have also enclosed the final approval letter, the Information Notice (Attachment A) which was prepared and distributed to recipients of the Envirocare Mailing List. The Information Notice illustrates the primary issues and concerns which the Division staff and our consultants, Rogers and Associates Engineering, identified. Those issues were satisfactorily resolved by Envirocare. If requested, copies of the interrogatories and other correspondence regarding technical evaluations, will be provided.

2. The Radiation Control Act, Utah Code 19-3-105 (Attachment B) requires legislative and gubernatorial approval of certain license amendments or other licensing actions. Specifically, Utah Code Annotated 19-3-105(1)(C)(iii) provides that any request for a storage or disposal facility to receive class B or class C low-level radioactive waste is included in the requirement for gubernatorial and legislative approval. Envirocare has never requested or submitted a license amendment for receipt and disposal of class B or class C waste. Although the Envirocare license does not mention the receipt of class B or class C waste, I assure you, the licensee is aware that under Utah law, they are not authorized to possess class B or C wastes at any time. As you know, the Envirocare License is undergoing renewal review. For clarity purposes and in accordance with Utah law, the license

SP-AG-28

issued to Envirocare, subsequent to completion of the renewal process, will contain a specific License Condition expressly prohibiting the receipt of class B and C low-level radioactive waste.

3. The current area used for low-level radioactive waste disposal was approved, by license amendment in March 1991. The volume capacity of that area is approximately 1.8 million cubic yards of waste. NORM wastes and low-level radioactive wastes are authorized to be disposed of in that area and consist of contaminated soil and soil-like materials and various types of contaminated debris. Since then, the Envirocare license has not been amended to increase capacity.

In 1991, coincidental with the license amendment, the surety was funded by including all identifiable closure costs for the entire site, including the costs of disposal of all types of waste in the low-level waste disposal area. The surety funds have been routinely increased to include the cost of inflation and increased to cover decontamination and decommissioning (closure) costs associated with new operations buildings and a large number of support facilities such as railroad track, roadways, evaporation ponds, waste storage and handling structures, and numerous other items. There are literally hundreds of items that have been identified and are accounted for in computing the surety amount.

In December 1991, the surety funds available were approximately $1,100,000.00. Currently, the surety is funded at approximately $ 5,800,000.00. This a five fold increase, which represents not only growth in Envirocare operations but also demonstrates the Division's vigilance in maintaining the necessary funding level.

In summary, the surety is adequately funded and provides the State, if necessary, the financial resources to close the facility to final specifications and requirements and to monitor the site after closure. Sufficient funds are available to unload, haul, dispose any and all types of wastes. Please contact Dane Finerfrock or me, if you need additional information or would desire to discuss any of the issues in greater detail.

Sincerely,

William J. Sinclair
Director

c: Denise Chancellor, Utah Attorney General's Office
Dianne R. Nielson, Ph.D., Executive Director, UDEQ
Utah Radiation Control Board members
Myron Bateman, E.H.S., M.P.A., Health Officer/Department Director, Tooele County Health Department
Milt Lammering, EPA Region VIII
Dennis Downs, Director, UDEQ/DSHW
Charles Hackney, NRC Region IV

ATTACHMENT A

State of Utah
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF RADIATION CONTROL

Michael O. Leavitt
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MAY 0 1 1996

FILE

April 30, 1996

Vernon E. Andrews
Corporate Radiation Safety Officer
Envirocare of Utah, Inc.
46 West Broadway, Suite 240
Salt Lake City, Utah 84101

Re: Ion Exchange Resin Disposal;
Radioactive Material License # UT2300249

Dear Mr. Andrews:

The staff has reviewed the information provided by you relating to the disposal of ion exchange resin at the Clive facility. We have concluded that the disposal of the resin mixed with unspecified native soils is consistent with the disposal of other debris authorized for disposal in the Envirocare license, specifically by License Conditions Nos. 38 and 40. Therefore, receipt and disposal of resin is permitted in accordance with all general operating procedures, license conditions and specific procedures developed for ion exchange resin disposal.

Although this approval does not require a license amendment, due to widespread interest, the Division is preparing a safety evaluation and public notice for distribution to the Utah Radiation Control Board and others on the Envirocare mailing list. Please contact Dane Finerfrock if you require additional information.

Sincerely,

William J. Sinclair,
Executive Secretary
Utah Radiation Control Board

c: Dennis Downs, DSHW
Myron Bateman, Tooele County Health Department

FILE

May 7, 1996

DIVISION of RADIATION CONTROL
UTAH DEPARTMENT of ENVIRONMENTAL QUALITY
ENVIROCARE of UTAH MAILING LIST INFORMATION NOTICE
Radioactive Material License No. UT2300249

Summary:

The Division of Radiation Control has determined that the disposal of ion exchange resin by Envirocare of Utah (the licensee) will not result in adverse environmental or public health impacts at the licensee's disposal site at Clive, Utah. The licensee has received Division approval to dispose of ion exchange resins.

By letter dated September 11, 1995, Envirocare requested Division approval for the disposal of ion exchange resin in the facility embankment. Envirocare stated that "it has been determined...that these materials can be handled in accordance with all requirements and will act as other materials already placed." However, the Division had not previously evaluated the acceptability of ion exchange resin as a waste form. Therefore, the Division and its consultants developed a series of questions for the licensee's evaluation and response.

Technical Evaluation:

Envirocare's response stated that the types and concentration of radionuclides contained in the ion exchange resins would not be different than those currently authorized in their radioactive material license. Furthermore, the resins would be thoroughly mixed with native soil at a ratio of 9 parts soil to 1 part resin, by volume, before disposal in the embankment. Therefore, the soil/resin mixture would not be substantially different from other radioactive contaminated debris-like wastes already authorized for 9:1 blending with soils and disposal by License Conditions Nos. 38 and 44. License Conditions 38 and 44 were developed after previous license amendment requests and subsequent evaluations identified debris disposal could cause differential settlement of the embankment and cover system. Condition 38 defined debris for the purpose of waste disposal. License condition 44 requires a 10% debris to 90% soil ratio be maintained. This permits the licensee to meet specified compaction requirements for disposed waste. Meeting the compaction requirements minimizes differential settlement, thus maintaining the integrity of the waste embankment cover system.

Envirocare also made arguments that 9:1 blending of soils and ion exchange resins would have no adverse impact to performance assessments provided previously to justify the cover design and engineering containment systems. These arguments focused on the fact that

previously approved contaminant transport models were conservative, because they used the lowest soil-water partitioning coefficients (K_d values) available from technical literature. In particular, the approved models used the lowest K_d values for both simulation of contaminant leaching from the waste form and transport through the unsaturated and saturated groundwater environments. Hence, leaching of nuclides from the embankment was conservatively over-estimated, as was their simulated transport to the compliance monitoring wells. As a result, any blending of ion exchange resins with native soils should not make the radiocontaminants more readily leached from the waste form, nor more mobile in the groundwater domain, than already simulated. To the contrary, even if the plastic matrix of the resins were to instantly deteriorate upon disposal, their prior blending with native soils could fix or stabilize the radioisotopes in the embankment, thus making them more difficult to leach than previously simulated.

Another important point considered by the Division was the fact that ion exchange resins from some sources are likely to contain fission and activation products which are readily leached and mobile in the groundwater environment, including: carbon-14, technetium-99, and tritium. However, a review of the current Radioactive Materials License shows that all the radioisotopes anticipated to occur in ion exchange resins are already authorized for disposal at Envirocare, each with their corresponding maximum concentration limits. Furthermore, the License requires mobile nuclides such as carbon-14, technetium-99, and tritium to be disposed only in the Mobile Waste Area, an area of the disposal embankment designed to contain highly mobile radionuclides. As a result, sufficient conditions exist in the License to adequately control and oversee disposal of ion exchange resins in the embankment; both from a perspective of engineering stability and performance assessment. Hence, no amendment to the License is needed to accommodate this proposal.

Further information regarding this issue can be obtained by contacting Bill Sinclair or Dane Finerfrock of the Division of Radiation Control, telephone 801-536-4250.

ENVIROCARE *OF UTAH, INC.*

THE SAFE ALTERNATIVE

October 26, 1995

Received OCT 1995 Division Of Radiation Control

Utah Division of Radiation Control
Attn: Mr. Dane Finerfrock
P.O. Box 144850
Salt Lake City, UT 84114-4850

Re: Ion Exchange Resin Stability

Dear Mr. Finerfrock:

Mr. Al Stengel of Industrial Water Systems has prepared a review of the technical issues regarding the suitability of ion exchange resins for disposal in a landfill disposal operation such as that conducted by Envirocare of Utah (Envirocare). Mr. Stengel concludes that the resins are well suited for disposal at Envirocare, exhibiting structural stability, strong chemical bonding to the resident radionuclides and desirable physical properties for mixing with soil to achieve compaction.

Envirocare believes that ion exchange resins are ideally suited for disposal when handled as compactible debris and mixed in a ratio of 10 percent by volume with soil. Disposal of structural debris such as wood, which is less resistant to biodegradation and does not bind the contaminating radionuclides as strongly as ion exchange resins, is now permitted under conditions 38, 42, and 44 of Envirocare's radioactive materials license. Envirocare is currently conducting studies to determine the leachability of Co-60 and Cs-137 from resin materials and the Kd values for those radionuclides in Clive site clay. We will provide the results of this study to the Division as soon as they are available.

If you have any questions or comments regarding Mr. Stengel's review, please call me at 532-1330.

Sincerely,

Vernon E. Andrews

Vernon E. Andrews
Corporate RSO

cc: Mr. Don Ostler,
Division of Water Quality

46 WEST BROADWAY • SUITE 240 • SALT LAKE CITY, UTAH 84101 • TELEPHONE (801) 532-1330

ION EXCHANGE RESIN STABILITY

Al Stengel, President
Industrial Water Systems

Prepared For

ENVIROCARE OF UTAH, INC.

September, 1995

ABSTRACT

Technical issues relative to ion exchange resin stability are discussed in this paper. This information supplements materials presented in the previous paper entitled "Radioactive Resin Disposal", August, 1995; prepared for Envirocare of Utah, Inc. With respect to synthetic resins used at commercial nuclear reactor facilities, the physical and chemical composition of the material provides a basis for stability. Resin design, structure and stability are considered for environmental suitability within a landfill disposal site.

RESIN DESIGN

Commercially available ion exchange resins (resins) used for treatment of aqueous solutions are synthesized from a polystyrene copolymer sulfonated with an ion - active group. The polymerization process results in small spherical beads (<1.0 mm) each containing thousands of exchange sites throughout the structure. In order for the resin to perform its ion exchange function, its design features include: extremely low solubility in water, physical and chemical stability, high total capacity to exchange ions, reversible equilibrium in the presence of strong regenerants, and kinetic properties to support ion exchange within the entire resin bead structure. The manufacturing process for resins allows highly uniform product yields within stringent tolerances by specification.

In aqueous solution, resin is also designed to shrink and swell in the presence of various ionic species. This capability allows the structure to vary in size without causing structural breakage. Depending on the degree of porosity within the resin bead structure, as much as thirty percent of the bead can retain water.

RESIN STRUCTURE

Conventional resins consist of two basic parts; the structural part (polymer matrix) and the functional part (ion-active group). During the sulfonation step of the resin synthesis process, the polystyrene structure undergoes a chemical substitution of an ion-active group or functional group. Chemical bonding or attachment of the functional group to the structural matrix is designed to be irreversible. The functional groups are typically amines or sulfonate radicals having either a positive or a negative charge. Positively or negatively charged ions in solution are exchanged at the active functional groups within the resin.

RESIN STABILITY

Resin is synthesized under controlled conditions to yield uniform product with specific properties including both physical and chemical stability. The operational life span for resin can be as long as five to ten years depending on its application and treatment. During the life span, resins can be deliberately exposed to strong chemicals for the purpose of their regeneration for reuse. The chemical regeneration process is a controlled sequence which exposes a specific type of resin to a specific regenerant chemical. Such processes cause variations in pH, resin bead size and chemical composition of the functional group which allow the resin's reuse for ion exchange. Following the chemical regeneration process, the resin is rinsed to remove residual chemicals from the resin mixture but without altering the ionic form of the regenerated resin. Depending upon the volume of resin and the geometric configuration of the resin's container, rinse flow rates can range from several gallons per minute to hundreds of gallons per minute. During the service life of the resin, beads can experience breakage to result in non-spherical shaped material. The physical strength of resin is known as friability and is measured by subjecting individual whole resin beads to physical pressure when placed on a hard surface. Friability values are specific to the operating application for the resin. Also, depending on the product production specifications, undersized beads or fractured beads (fines) can be present in the resin mixture. Notwithstanding the size or shape of the resin structure, functional groups are present to allow ion exchange to occur. However, in applications where high purity water is produced, optimum resin performance and handling is supported by the use of whole, spherical beads.

Chemical stability of resins is evidenced by operating performance history since 1935 when the first synthetic organic ion exchange resins were produced. Resin manufacturers have subjected a number of resins to a wide variety of tests where strong chemicals were applied. Published literature indicates that extremely strong oxidizing agents such as nitric acid will degrade the polymer matrix. Oxidant attack for cation resin is primarily on the polymer

structure while attack for anion resin is primarily on the functional groups. The pH of the solution is also a factor for chemical bond stability at high temperatures (+150 Deg. C for cation; +50 Deg. C for anion). Also the degree of polymer crosslinkage plays a role in structural stability. More highly crosslinked polymers have more exchange sites which equates to greater tolerance to attack. The presence of a strong oxidant is needed to alter chemical bonding.

RESIN SUITABILITY FOR LANDFILL DISPOSAL

Used resin is discarded from a number of operations. The physical and chemical properties of the resins remain intact as long as there has been no exposure to strong oxidants, high fields of gamma radiation, excessive temperature, or forces sufficiently large to break the chemical bonds within the polymer structure. The polystyrene (plastic) structure of the resin matrix is highly resistant to attack as discussed above. Ionically, cationic and anionic radionuclides present with the resin are chemically bonded. An environment of extreme pH caused by a strong acid (oxidant) or a strong base would be candidate for resin degradation. In cases where biological species have been reported to interact with resin, presumably it is only interaction with the functional groups of the resin without affect on the polymer structure. In any case, the biological species would need to be of sufficiently high strength (i.e. similar to that of oxidants, etc) to alter the resin structure or to elute the radionuclides from the resin functional groups. Also, resin selectivity or preference for one ion over another plays a significant role. Cases have been reported where certain organic materials were found to be present with resins. Upon further investigation, it appeared that the organic or biological mate ials were part of the contained volume delivered from the ger r and not necessarily an attachment to the resin or a bypr of decomposition. Often times, solvents and lubricants use in industrial facilities become mixed with materials en route for disposal. The detection of substances similar to these or sanitary wastes can lead to speculation on resin condition.

Resin disposal in a landfill designed to contain compacted soils and debris is an option under consideration. The physical stability of resins or fractured resin beads which also contain the functional groups are amenable to mixing with soil in preparation for compaction and placement. The nominal size of a resin bead is less than a millimeter in diameter. Mixing resin beads with soil would be similar to mixing fine aggregate such as sand with soil. The mixing ratio and moisture content values used can be optimized for resin disposal. The physical stability of the resin structure (polystyrene) and the chemical stability of the resin functional groups (chemical bonding) to which the radionuclides are chemically

bonded by ion exchange preferences must be challenged by an environmental force within the landfill in order to create an altered form of the material. Landfill permits typically require that materials be within a specified pH range as a condition of placement. The pH range exclusive of either high or low extremes would preclude the presence of a solute of sufficient strength to attack resin structure or resin functional groups. A minimal flow of liquid within the layers of the embankment would be ineffective for purposes of transporting chemically bonded ions from the resin. Stresses imposed due to material compaction after blending and mixing would be expected to alter the physical characteristics of resin beads if insufficient mixing ratios and moisture content were used. However, as previously discussed, fractured resin beads retain their chemical bonding with respect to ion exchange and the polymer crosslinkage bonding, etc.

In summary, at least four protective barriers can be identified to support low level radioactive resin placement within a landfill:

1. Resin design - chemical bonding of the radionuclides
2. Use of minimum mixing ratios and moisture content for optimum compaction.
3. Landfill design characteristics for long term environmental stability.
4. Disposed material condition - pH limits

Although other disposal methods are in operation at commercial facilities, ion exchange resin disposal under controlled landfill conditions is also an option. Technically, the properties of resin should allow stable placement within compacted, moist soil without a need for containers or bonding materials.

References:

- The Dow Chemical company; manufacturers of ion exchange resins and chemicals used for resin processing.

- EPRI Low Level Radioactive Waste Conference Minutes; misc. papers related to waste processing and disposal.

- Chemical Extraction of Radioisotopes from Resins; 1995 lab tests at a commercial radioactive waste processing center.

- U.S. Commercial Nuclear Power Facility Experiences; staff assignments and contract work at numerous reactor facilities using resin processes.

- Process Equipment & Methods; continuing interface with suppliers and research institutes.

- Patented Technology; ongoing consultation to licensees on resin processing technologies and their commercialization.

ENVIROCARE OF UTAH, INC.

THE SAFE ALTERNATIVE

SEP 1995
Received
Division Of
Radiation
Control

September 11, 1995

Mr. William J. Sinclair
Executive Secretary
Utah Radiation Control Board
168 North 1950 West
P.O. Box 144850
Salt Lake City, Utah 84114-4850

Dear Mr. Sinclair:

A contract will be completed between Customer #0711 and Envirocare of Utah for 23,000 cubic feet of contaminated low-activity waste material. The waste material originated in the state of Arizona and will be transported in containers by rail to Envirocare's facility in Clive, Utah, with the first shipment to arrive by October 1, 1995.

The waste material is described as absorbed residues for a cleaning process and bead resins. In the past, Envirocare has not received this form of bead resins, however, after research of the situation it has been determined by Envirocare that these materials can be handled in accordance within all requirements and will act as other materials already placed. To support this, Envirocare has attached a complete report on resin disposal. The isotopes and concentrations present in the waste are Cobalt-60 at less than 360 pCi/g, disposed.

Sincerely,

Charles A. Judd

Charles A. Judd
Vice President

CAJ/kk

46 WEST BROADWAY • SUITE 240 • SALT LAKE CITY, UTAH 84101 • TELEPHONE (801) 532-1330

RADIOACTIVE RESIN DISPOSAL

Al Stengel, President
Industrial Water Systems

Prepared For

ENVIROCARE OF UTAH, INC.

August, 1995

ABSTRACT

This paper provides technical information relative to ion exchange resins (resins) and their applications in the operations at commercial nuclear power facilities. A general discussion of resin structures and functional capabilities is included to support specific resin performance for radioisotope treatment. Finally, several resin disposal options for radioactive resins are discussed. Disposal options include uncontained material placement at licensed landfills.

RESIN PROPERTIES

Synthetic resins are designed for the treatment of aqueous solutions containing dissolved or ionized solids. Ionized solids can be present in solution with either a positive or a negative charge. Resins are designed to exchange with either positively or negatively charged dissolved solids. For example, cation resin in the hydrogen form is designed to exchange the hydrogen held to the resin's functional group for available cations in the solution. Available cations can be such elements as: calcium, cobalt, sodium, cesium, copper, nickel, potassium, etc. Anion resin is designed to exchange its functionally exchanged hydroxide for other available anions or negatively charged solids present in the solution. In practice, water treatment by ion exchange results in highly purified water due to enrichment with hydrogen and hydroxide ions from the resins.

Resins by design have a defined order of preference for various species in solution. For example, a cation resin can be designed to exchange its hydrogen with an available cobalt ion in preference to an available sodium ion in the same proximity within the solution. This exchange preference is referred to as resin selectivity.

Resins are also designed to be chemically regenerated or recharged for multiple reuses. Regeneration is performed with strong solutions of acid or base. A strong acid is rich in hydrogen ions which exchange with the cationic ions on the cation resin to result in hydrogen rich cation form resin. Anion resins are regenerated with strong bases which are rich with hydroxyl ions. Under normal circumstances, ionic displacement of a highly selected cation or anion from its respective resin occurs in the presence of an

appropriate strong acid or strong base.

Today's synthetic resins used in commercial applications to treat aqueous solutions are typically manufactured to similar standards. In most cases, the greatest population of resins is manufactured from a copolymer of styrene divynlbenzene. Cation resin is usually a strongly acidic, sulfonated form of the copolymer. Anion resin is usually a strongly basic, quarternary ammonium form of the copolymer. Both resin structures are highly stable with respect to the base copolymer and functional groups as is evidenced in a wide variety water treatment applications at operating temperatures as high as 135 degrees F. In some applications, the resin's structural integrity is frequently challenged during operation when it is slurried through pipes between process tanks or when solution pH variations stress the physical strengths of the resin beads. There are different types of resin forms to suit particular applications.

RESIN APPLICATIONS AT COMMERCIAL NUCLEAR REACTORS

Commercial nuclear reactor facilities use resins for a number of applications to treat solutions. Some of these applications are: condensate make up to the condenser hotwell, condensate demineralization to purify water for reuse as feedwater, steam generator blowdown treatment to allow reuse of water, reactor clean up water treatment to reduce radioactivity and remove solids, nuclear fuel pool cleanup, liquid radioactive waste treatment to reduce activity levels, liquid sample treatment prior to sample analysis, and others depending on the specific facility design.

Most if not all reactor facilities generate volumes of spent resin that is only slightly contaminated. Typically, PWR facilities have secondary plant spent resin with peaks of Cs-137 or Co-60 at levels on the order of E-8 pCi/gm. Nonetheless, the resin is segregated for radioactive waste disposal. The predominant radioisotopes found in spent resins from commercial PWR's include: Co-60, C0-58, Fe-55, Cs-134, Cs-137, and Mn-54. The BWR facilities generate spent resins with predominant species including: similar isotopes to the PWR's and Zn-65. The radioactivity levels associated with a spent resin charge can be correlated to the type of facility, the application or system where the resin was used, and the length of time that the resin was in operation. As an example, some operations remove resin from service when activity levels or the decontamination factor reaches a predetermined value. Other operations allow the resins to reach considerably higher activity levels which ultimately leads to higher activity levels within the facility as well as higher resin disposal costs due to higher curie content, etc. PWR condensate demineralizer resins are typically removed from operation when chemistry is no longer sustained or when the resins can no longer be properly regenerated.

GENERATOR OPTIONS FOR RADIOACTIVE RESIN DISPOSAL

Commercial nuclear reactor facilities have become more efficient in recent years with respect to generation of solid radioactive waste volumes. One of the largest contributors is spent resin. There are a number of options available to generators for disposal of spent resins. These include: interim storage on site, incineration, dewater and bury, filler with other waste medias, chemical decontamination and free release, and disposal via soil compaction at licensed landfills. Each of these options has associated commercial, technical and political advantages / disadvantages which are disposal site specific as well as reactor site specific.

RESIN SUITABILITY FOR UNCONTAINED DISPOSAL AT A LICENSED LANDFILL

Bead form resins with activity levels within the limits of a disposal site license are candidates for uncontained disposal. The physical structure of the copolymer matrix lends to a high stability with respect to decomposition. The environment within the landfill would be considered to be *significantly* less aggressive than the environment to which the resin is designed to operate at the nuclear power facility. Chemically, the resin will retain its bonding with the ionic species removed from the reactor facility process water. Depending on the order of species selectivity, less selected ions would not displace more selective species unless a strong chemical (acid, base, oxidant, etc.) was introduced to the resin. Optimum ion exchange occurs under flowing conditions. Exposure under static conditions yields poor results at standard temperature and pressure. Cationic species such as Co-60 and Cs-137 would not be readily displaced by a salt such as NaCl because of the lower selectivity by the cation resin for sodium (Na). Anionic species such as Iodine would not be displaced by Chloride due to the lower selectivity of Chloride. As long as the ionized radioisotope is bound to the resin by ion exchange or adsorption, there is no potential for leaching into surrounding environments. Porous forms of bead resin can contain 30 % - 50 % moisture. Depending on the license requirements for the site, the moisture content in the resin can be reduced without altering the ionic form of the resin. Numerous ionized and suspended species can be effectively removed from resin to reduce activity levels where necessary. These decontamination methods are normally required when the resin mixture contains varying amounts of non - resinous material or when the resin mixture contains sufficiently high levels of activity to prevent disposal within landfill limits.

The physical forces which can alter a resin beads ability to retain exchanged ions include: excessive pressure, excessive temperature, and interaction with a strong chemical. A process to mix resin with soil to maximize compaction is not considered to be detrimental to resin stability. Due to the design and inherent stability of the resin matrix, bead form resins should be considered suitable for disposal in soil landfills.

References:

- The Dow Chemical Company; manufacturers of ion exchange resins and chemicals used for resin processing.
- EPRI Low Level Radioactive Waste Conference Minutes; misc. papers related to waste processing and disposal.
- Chemical Extraction of Radioisotopes from Resins; 1995 lab tests at a commercial radioactive waste processing center.
- U.S. Commercial Nuclear Power Facility Experiences; staff assignments and contract work at numerous reactor facilities using resin processes.
- Process Equipment & Methods; continuing interface with suppliers and research institutes.
- Patented Technology; ongoing consultation to licensees on resin processing technologies and their commercialization.
- Radioactive Waste Processors; prior and ongoing interface with leading waste handling service groups.

ATTACHMENT B

1995

RADIATION CONTROL ACT

Utah Code §§ 19-3-101 through -301

address the same circumstances.

(b) In adopting those rules, the board may incorporate corresponding federal regulations by reference.

(7) (a) The board may adopt rules more stringent than corresponding federal regulations for the purpose described in Subsection (6) only if it makes a written finding after public comment and hearing and based on evidence in the record that corresponding federal regulations are not adequate to protect public health and the environment of the state.

(b) Those findings shall be accompanied by an opinion referring to and evaluating the public health and environmental information and studies contained in the record which form the basis for the board's conclusion.

(8) (a) The board may by rule establish criteria for siting commercial low-level radioactive waste treatment or disposal facilities.

(b) Any facility for which a radioactive material license is required by this section shall comply with those criteria.

(c) A facility may not receive a radioactive material license until siting criteria have been established by the board. The criteria also apply to facilities that have applied for but not received a radioactive material license.

(9) The board shall by rule establish financial assurance requirements for closure and postclosure care of radioactive waste land disposal facilities, taking into account existing financial assurance requirements.

History. C. 1953, 26-1-27, enacted by L. 1981, ch. 126, § 2; 1987, ch. 12, § 1; 1988, ch. 168, § 1; 1989, ch. 180, § 1; renumbered by L. 1991, ch. 112, §§ 69, 242; 1991, ch. 126, § 1; 1994, ch. 188, § 4; 1995, ch. 28, § 8; 1995, ch. 90, § 2.

Administrative Rules. - This section is implemented by, interpreted by, or cited as authority for the following administrative rule(s): R313-12, R313-15, R313-16, R313-18, R313-19, R313-22, R313-25, R313-28, R313-30, R313-32, R313-36, R313-38, R313-40, R313-44.

Amendment Notes. - The 1987 amendment designated the former provisions of this section as Subsection (1) and added Subsections (2) and (3).

The 1988 amendment, effective July 1, 1988, divided former Subsection (1) into Subsections (1) and (3), added Subsections (2) and (4), and redesignated former Subsections (2) and (3) as Subsections (5) and (6).

The 1989 amendment, effective April 24, 1989, deleted "but not limited to" following "including" in Subsection (2); inserted the subsection designations (a) and (b) in Subsection (5) and in Subsection (6); added Subsection (7); and made stylistic changes.

The 1991 amendment by ch. 112, effective July 1, 1991, renumbered this section, which formerly appeared as § 26-1-27, substituted "board" for "department" throughout, deleted a reference to Subsection (2) of Section 63-38-3 in Subsection (4)(b), and added a Subsection (8).

The 1991 amendment by ch. 126, effective January 1, 1992, added present Subsection (5) and redesignated former Subsections (5) through (7) as present Subsections (6) through (8), deleted "(2)" after "63-38-3" in Subsection (4)(b), and substituted "(7)" for "(6)" in Subsection (6)(a).

The 1994 amendment, effective May 2, 1994, added Subsection (3)(b), making related designation and grammatical changes; inserted "by rule" in Subsection (8)(a); and rewrote Subsection (9).

The 1995 amendment by ch. 28, effective May 1, 1995, substituted "63-38-3.2" for "63-38-3" in Subsection (4)(b).

The 1995 amendment by ch. 90, effective May 1, 1995, added Subsection (3)(c), changed the code reference in Subsection (4)(b) from 63-38-3, and made stylistic changes.

This section is set out as reconciled by the Office of Legislative Research and General Counsel.

19-3-105. Legislative and gubernatorial approval required.

(1) (a) A person may not own, construct, modify, or operate any facility for the purpose of commercially transferring, storing, decaying in storage, treating, or disposing of radioactive waste without first submitting and receiving the approval of the board for a radioactive material license for the facility.

(b) A person may not construct a new commercial radioactive waste transfer, storage, decay in storage, treatment, or disposal facility until:

(i) the requirements of Section 19-3-104 have been met;

(ii) in addition and subsequent to the approval required in Subsection (a), the governor and the Legislature have approved the facility; and

(iii) local planning and zoning has authorized the facility.

(c) For purposes of this section, the following items shall be treated as submission of a new license application:

(i) the submission of a revised application specifying a different geographic site than a previously submitted application;

(ii) an application for amendment of a commercial radioactive waste license for transfer, storage, decay in storage, treatment, or disposal facilities, including incinerators, if the construction would cost 50% or more of the cost of construction of

the original transfer, storage, decay in storage, treatment, or disposal facility or the modification would result in an increase in capacity or throughput of a cumulative total of 50% of the total capacity or throughput which was approved in the facility license as of January 1, 1990, or the initial approval facility license if the initial license approval is subsequent to January 1, 1990; or

(iii) any request for approval for a commercial radioactive waste transfer, storage, decay in storage, treatment, or disposal facility to receive class B or class C low-level radioactive waste, including the submission of a new license application, revised license application, or major license amendment.

(2) A person need not obtain gubernatorial or legislative approval for the construction of a radioactive waste facility for which a license application has been approved by the Department of Health or submitted to the federal Nuclear Regulatory Commission and to the Department of Health for approval before January 1, 1990, and which has been determined, on or before October 31, 1990, by the Department of Health to be complete in accordance with state and federal requirements.

(3) The board shall suspend acceptance of further applications for commercial radioactive waste facilities upon a finding that they cannot adequately oversee existing and additional radioactive waste facilities for license compliance, monitoring, and enforcement. The board shall report the suspension to the Legislative Management Committee.

(4) The board shall review each proposed radioactive waste license application to determine whether the application complies with the provisions of this chapter and the rules of the board.

(5) (a) If the radioactive license application is determined to be complete, the board shall issue a notice of completeness.

(b) If the plan is determined by the board to be incomplete, the board shall issue a notice of deficiency, listing the additional information to be provided by the applicant to complete the application.

History: C. 1953, 26-1-27.2, enacted by L. 1990, ch. 297, § 3; renumbered by L. 1991, ch. 112, § 70; 1994, ch. 188, § 5.

Amendment Notes. - The 1991 amendment, effective July 1, 1991, renumbered this section, which formerly appeared as § 26-1-27.2, substituted "board" for "department" throughout, in Subsection (1)(b)(i) substituted "Section 19-3-104" for "Section 26-1-27," in Subsection (2) substituted "Department of Health" for "department" and deleted "under Section 26-1-27" following "approval," and made stylistic changes throughout.

The 1994 amendment, effective May 2, 1994, inserted "commercially transferring, storing, decaying in storage" in Subsection (1)(a); inserted "transfer, storage, decay in storage" in Subsection (1)(b) and in two places in Subsection (1)(c)(ii); added Subsection (1)(c)(iii); and made related changes.

Effective Dates. - Laws 1990, ch. 297 became effective on April 23, 1990, pursuant to Utah Const., Art. VI, Sec. 25.

19-3-106. Fee for commercial radioactive waste disposal or treatment.

(1) An owner or operator of any commercial radioactive waste treatment or disposal facility that primarily receives waste generated by off-site sources not owned, controlled, or operated by the facility or site owner or operator that is subject to the requirements of this chapter shall collect from the generator of the waste:

(a) on and after July 1, 1992, through June 30, 1993, a fee of $2.00 per ton or fraction of a ton on all radioactive waste received at the facility or site for disposal or treatment;

(b) on and after July 1, 1993, through June 30, 1994, a fee of $2.25 per ton or fraction of a ton on all radioactive waste received at the facility or site for disposal or treatment; and

(c) on and after July 1, 1994, a fee of $2.50 per ton or fraction of a ton on all radioactive waste received at the facility or site for disposal or treatment.

(2) (a) The owner or operator shall pay the fees imposed under this section to the department on or before the 15th day of the month following the month in which the fee accrued.

(b) The department shall deposit all fees received under this section into the restricted account created in Section 19-1-108.

(c) The owner or operator shall submit to the department with the payment of the fee under this subsection a completed form as prescribed by the department that provides information the department requires to verify the amount of waste received and the fee amount for which the owner or operator is liable.