MOLECULAR SEPARATIONS, INC.

JOHN S. ST.GENIS
PRESIDENT & CHIEF EXECUTIVE OFFICER

February 14, 2000

Mr. William D. Travers
Executive Director of Operations
Nuclear Regulatory Commission
11555 Rockville Pike
Mail Stop O-16 E15
Rockville, MD 20852-2738

Dear Mr. Travers:

Molecular Separations, Inc., a start-up company, has developed an economically viable process for removal of low concentrations of tritiated water from contaminated streams. We would like to bring this technology to your attention. Attached is a one-page synopsis of the process. The process has broad acceptance in the wastewater remediation community. Technical papers describing the process and its application to nuclear wastewater clean up will be presented at Waste Management 2000 and the AIChE National Meeting. MSI's process was recommended for testing in the DOE "1999 Evaluation of Tritium Removal and Mitigation Technologies for Wastewater Treatment".

MSI has had a number of discussions with DOE and contractor personnel at sites having significant contaminations of tritiated water. There has been reasonable interest, but no project commitment to date. We believe the process merits large-scale demonstration and application. Please consider the material and pass it on to individuals with oversight for this problem.

I would be happy to meet with you, or any designee, to discuss this further. Please go to our web site for additional technical information.

Sincerely,

Jack

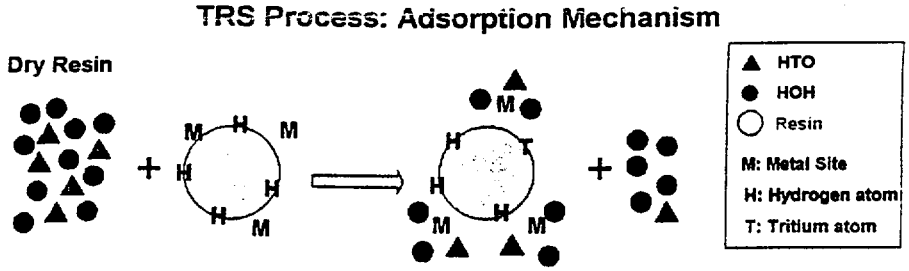
Enclosure

000214 NRC

2033 WOOD STREET, SUITE 120, SARASOTA FL 34237 · VOICE (941) 951-6771 · FAX (941) 957-0811
WEB SITE WWW.MOSEP.COM EMAIL JACK@MOSEP.COM

Technology for Water Isotope Separation

Mechanism: Isotopes are forms of the elements that differ in the number of neutrons (uncharged atomic mass) and molecules that contain these elements. Many isotopes are unstable because of an excess of neutrons and decay radioactively to more stable structures. Tritium is an unstable isotope of hydrogen that decays to non-radioactive helium. Tritium is produced as a byproduct of many nuclear processes and is usually found in the oxidized state as tritiated water (HTO). Isotopes have very similar properties and are thus difficult (but possible) to separate. HTO may be separated from light water by distillation (higher boiling point), cryogenics (higher freezing point), diffusion (slower) and by selective adsorption. MSI's process incorporates a metal cation site that is easily hydrated, and which holds HTO preferentially to light water due to HTO's higher heat of hydration. Adsorption is particularly effective at low concentrations typical of environmental contaminations. The mechanism is illustrated below.



The metal sites saturate relative to the HTO in the feed. The adsorption material is regenerated by heating in hot air driving off all waters of hydration.

Test Results: The US Environmental Protection agency has set a very strict standard for tritium in drinking water (0.02 micro Curies per liter). Nuclear power plant reactor cooling water is typically 10,000 times the standard and groundwater at many US Department of Energy sites is 100 to 1000 times the standard. MSI has tested samples from power plants and DOE sites ranging from 50,000 to as low as 15 times the standard and consistently achieved reductions on the order of 80%. Greater reductions have been achieved using larger amounts of adsorption material. The tests were conducted at the Clemson Environmental Technologies Laboratory in a series of upflow adsorption columns.

Large Scale Applications: A closely analogous process, water deionization, is practiced world-wide on a large scale, using adsorption material similar to that in the MSI process. MSI has contracted with a major firm providing equipment and services to the nuclear utility market and intends to use similar design elements for removal of HTO from contaminated streams. MSI has used commercially produced adsorbents as the base material to support the selective site and will contract with a major firm(s) in that area to provide the complete adsorbent (base plus selective site). Initial commercial units will be very similar to current water treating plants. The technology will probably evolve to more unique and more optimum designs and customized adsorbents over time.

To: Kane, NMSS
G20000082

OFFICE OF THE SECRETARY
CORRESPONDENCE CONTROL TICKET

Date Printed: Feb 24, 2000 08:08

PAPER NUMBER: LTR-00-0133 **LOGGING DATE:** 02/23/2000

ACTION OFFICE: EDO

AUTHOR: JOHN ST GENIS

AFFILIATION:

ADDRESSEE: RICHARD MESERVE

SUBJECT: DEVELOPMENT OF PROCES FOR REMOVAL OF LOW CONCENTRATIONS OF TRIATIATED WASTE FM CONTAMINATED STREAMS.....

ACTION: Appropriate

DISTRIBUTION: CHAIRMAN, COMRS, OPA

DWM

LETTER DATE: 02/14/2000

ACKNOWLEDGED No

SPECIAL HANDLING: OCM #1360

NOTES:

FILE LOCATION: IP-2

DATE DUE: **DATE SIGNED:**

133 1360

MOLECULAR SEPARATIONS, INC.

JOHN S. ST.GENIS
PRESIDENT & CHIEF EXECUTIVE OFFICER

February 14, 2000

Mr. Richard A. Meserve
Chairman
Nuclear Regulatory Commission
11555 Rockville Pike
Mail Stop O16 C1
Rockville, MD 20852-2738

Dear Mr. Meserve:

Molecular Separations, Inc., a start-up company, has developed an economically viable process for removal of low concentrations of tritiated water from contaminated streams. We would like to bring this technology to your attention. Attached is a one-page synopsis of the process. The process has broad acceptance in the wastewater remediation community. Technical papers describing the process and its application to nuclear wastewater clean up will be presented at Waste Management 2000 and the AIChE National Meeting. MSI's process was recommended for testing in the DOE "1999 Evaluation of Tritium Removal and Mitigation Technologies for Wastewater Treatment".

MSI has had a number of discussions with DOE and contractor personnel at sites having significant contaminations of tritiated water. There has been reasonable interest, but no project commitment to date. We believe the process merits large-scale demonstration and application. Please consider the material and pass it on to individuals with oversight for this problem.

I would be happy to meet with you, or any designee, to discuss this further. Please go to our web site for additional technical information.

Sincerely,

Jack

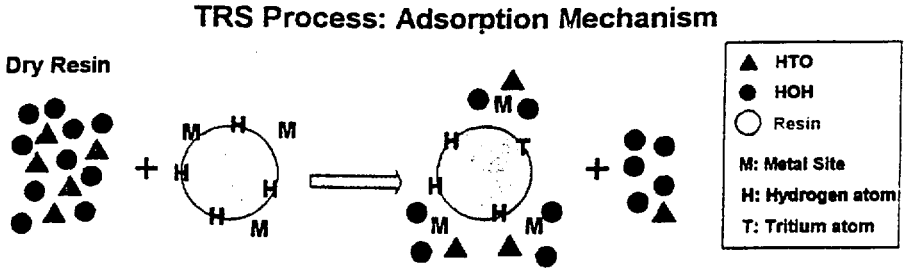
Enclosure

000214 NRC

2033 WOOD STREET, SUITE 120, SARASOTA FL 34237 ·VOICE (941) 951-6771 ·FAX (941) 957-0811
WEB SITE WWW.MOSEP.COM EMAIL JACK@MOSEP.COM

Technology for Water Isotope Separation

Mechanism: Isotopes are forms of the elements that differ in the number of neutrons (uncharged atomic mass) and molecules that contain these elements. Many isotopes are unstable because of an excess of neutrons and decay radioactively to more stable structures. Tritium is an unstable isotope of hydrogen that decays to non-radioactive helium. Tritium is produced as a byproduct of many nuclear processes and is usually found in the oxidized state as tritiated water (HTO). Isotopes have very similar properties and are thus difficult (but possible) to separate. HTO may be separated from light water by distillation (higher boiling point), cryogenics (higher freezing point), diffusion (slower) and by selective adsorption. MSI's process incorporates a metal cation site that is easily hydrated, and which holds HTO preferentially to light water due to HTO's higher heat of hydration. Adsorption is particularly effective at low concentrations typical of environmental contaminations. The mechanism is illustrated below.



The metal sites saturate relative to the HTO in the feed. The adsorption material is regenerated by heating in hot air driving off all waters of hydration.

Test Results: The US Environmental Protection agency has set a very strict standard for tritium in drinking water (0.02 micro Curies per liter). Nuclear power plant reactor cooling water is typically 10,000 times the standard and groundwater at many US Department of Energy sites is 100 to 1000 times the standard. MSI has tested samples from power plants and DOE sites ranging from 50,000 to as low as 15 times the standard and consistently achieved reductions on the order of 80%. Greater reductions have been achieved using larger amounts of adsorption material. The tests were conducted at the Clemson Environmental Technologies Laboratory in a series of upflow adsorption columns.

Large Scale Applications: A closely analogous process, water deionization, is practiced world-wide on a large scale, using adsorption material similar to that in the MSI process. MSI has contracted with a major firm providing equipment and services to the nuclear utility market and intends to use similar design elements for removal of HTO from contaminated streams. MSI has used commercially produced adsorbents as the base material to support the selective site and will contract with a major firm(s) in that area to provide the complete adsorbent (base plus selective site). Initial commercial units will be very similar to current water treating plants. The technology will probably evolve to more unique and more optimum designs and customized adsorbents over time.