SPONGE-JET®

Sponge Blasting System

Compilation of Sponge Jet Use in Radiological Decontamination Applications

Prepared by: Robert M. Beinstein
for Sponge Jet, Inc., Eliot, ME
September 30, 1997

TABLE OF CONTENTS

1. INTRODUCTION 1

2. THE SPONGE MEDIA 1

3. APPLICATIONS 1

3.1. PIPE END DECONTAMINATION DURING STEAM GENERATOR REPLACEMENT PROJECTS (SGRP): 1

3.2. GENERAL DECONTAMINATION OF BY-PRODUCT MATERIAL: 2

3.3. GENERAL DECONTAMINATION TASKS ON NUCLEAR FUEL/URANIUM SITES: 3

4. CONCLUSIONS 3

September 30, 1997

1. Introduction

The Sponge Jet system was originally designed and manufactured for use in non-radiological applications such as coatings removal and surface preparation. As its capabilities developed and became more widely known, numerous end users undertook various test projects to evaluate the system's applicability to nuclear decontamination tasks. That the result of these projects was favorable is evident from the fact that many of the initial evaluative efforts led to follow on commercial production use of Sponge Jet technology in the nuclear marketplace.

This document provides a preliminary summary of the radiological decontamination tasks to which Sponge Jet has been applied in both the commercial and non-commercial branches of the nuclear industry.

2. The Sponge Media

The media designed for use in the Sponge Jet system, by nature of its physical characteristics and kinetic behavior, lends itself naturally to use in the necessarily controlled environment of radiological decontamination. The media deforms upon substrate impact, resulting in a much less elastic (more plastic) impact than exhibited by more conventional impact media (e.g., sand, metal grit, etc.), resulting in lower magnitude of rebound impact on operator, equipment and/or protective clothing. It also has a fairly high void space to solid media ratio, allowing the sponge media to retain removed contaminants. This property gives the media low dust generation properties and reduce the risk of potential cross contamination during spent media removal and waste packaging.

3. Applications

The Sponge Jet system has been used by end users in a variety of configurations and applications. The applications range from routine decontamination tasks performed with the standard Sponge Jet system machinery to specialized decontamination projects in which application-specific equipment was designed and built to augment standard sponge media delivery systems in a manner appropriate to the tasks at hand. Following is a brief compilation of Sponge Jet's nuclear applications to date.

3.1. Pipe End Decontamination During Steam Generator Replacement Projects (SGRP):

When commercial nuclear generation facilities must, for a variety of reasons, replace their steam generators (SG), the primary piping sections that are cut to allow removal and replacement of the SG can be a significant source of personnel radiation exposure.

Specialized nuclear service firms, notable Framatome Technologies and AEA Technologies Engineering Services, have used sponge media delivered through proprietary engineered additions to the Sponge Jet delivery systems to effect pipe end decontamination at numerous nuclear power plants, in both the United States and abroad. The results of these projects has been quite favorable.

Decontamination factors (DF) in this application indicate the factors by which exposure, or dose, rate is reduced by the technology applied. This measurement is somewhat problematic, given that the surface being decontaminated is not the only major contributor to area dose rates. Nonetheless, reductions in overall dose rates in a range from three to ten have been documented in repeated uses of these systems. A sampling of "before and after" measurements is presented in Table 1, below.

Table 1

Facility	Pre-Decon Dose Rate (Mean, in mR/hr)	Post-Decon Dose Rate (Mean, in mR/hr)	Decon Factor	% Dose Rate Reduction
Maguire 1	1990	630	3.29	87.5%
Catawba	3055	850	3.83	82.3%
N. Anna	5400	1900	3.75	75.8%
V. C. Summer	6000	1000	4.94	74.8%
C. N. de Almarez	2500	700	2.78	55.3%

Notes:

1) % dose rate reduction data includes shielding factors
2) All dose rate readings obtained at the plane of the pipe end opening
3) Data shown represents averages of reported data on individual components

Currently, additional pipe end decontamination projects are planned at Maguire 2 and St. Lucie. Both will commence during the 1997 calendar year.

3.2. General Decontamination of By-Product Material:

Several production scale projects are ongoing in this area. While data is currently being gathered on these efforts, a preliminary summary follows:

3.2.1. Entergy, Inc. is using the Sponge Jet system at its Arkansas Nuclear One site in Russelville, AK to perform a variety of surface preparation and decontamination tasks, including decontaminating and preparing the inside surfaces of interim spent fuel storage casks.

3.2.2. At Florida Power and Light's St. Lucie Nuclear Plant, Sponge Jet was used to remove boric acid residues from the reactor head bolt flange and to clean the reactor head seal ring area during a recent planned outage. Additional work of this type is planned for an upcoming outage.

3.3. General Decontamination Tasks on Nuclear Fuel/Uranium Sites:

Sponge Jet has been used effectively in demonstration scale facility decontamination as well as in production scale decontamination and decommissioning projects.

3.3.1. Currently underway, the Formerly Utilized Sites Remedial Action Project (FUSRAP) project at Praxair in Tonowanda, NY is employing Sponge Jet technology in this site remediation project. Published results of this project are unavailable as of this writing, however anecdotal accounts indicate that Sponge Jet is meeting or exceeding its performance objectives at this site.

4. Conclusions

The Sponge Jet decontamination system has proven to be quite effective in a variety of radiological decontamination applications to date. Given Sponge Jet, Inc.'s traditional emphasis as a materials supplier for non-nuclear applications, the effort to gather evidentiary data as to the product's effectiveness in the nuclear marketplace is currently in its initial stages. Additional data collection on the system's performance in a variety of application is ongoing, with this document serving as a preliminary compilation. Based on currently available data, the Sponge Jet system exhibits great promise as a potent tool in pursuit of successful nuclear facility and radioactive material decontamination and decommissioning projects.