Washington State University

STANDARD OPERATING PROCEDURES FOR HAZARDOUS CHEMICALS
MS-222 (Tricaine Methane Sulfonate or Tricaine Mesilate)

PROCEDURE / PROCESS	MS-222 is used for anesthesia and euthanasia of fishes and other aquatic species. MS-222 is water soluble and should be prepared in water similar to the culture conditions of the animal. The water should have appropriate pH, temperature, alkalinity, hardness, salinity, and adequate levels of dissolved oxygen for the subjects. The prepared solution should be buffered to a neutral pH (approximately 7.0) before use. Use of freshly prepared solutions is recommended, as preparations 10 days old demonstrate ~5% decreased potency. Use as an anesthetic: The action of MS-222 as an anesthetic varies widely between species and is affected by water temperature, hardness, and size of the individual fish. Preliminary tests are necessary to determine the concentration and exposure time for each application. Higher concentrations of MS-222 result in rapid anesthesia with shorter maximum tolerated exposure times. Commonly used concentrations for rapid anesthesia range from 70 – 330 mg/L. Lower concentrations of MS-222 result in longer induction times and longer maximum tolerated exposure time. Commonly used concentrations for moderately rapid anesthesia range from 50 – 70 mg/L. Animals are revived by returning them to clean, untreated water, preferably from their home environment. Use for euthanasia: MS-222 can be used to euthanize fish. Preliminary tests are necessary to determine the concentration (mg/L) and exposure time necessary for mortality. The concentration of MS-222 used for euthanasia should result in medullary collapse (opercular activity ceases in fish). The exposure time should be adequate that a return to fresh water will not result in recovery of the animal.
CHEMICAL NAME(S) and associated PHYSICAL and HEALTH HAZARDS  CHEMICAL	MS-222; CAS No: 886-86-2 MS-222 is an acidic solution and may be irritating by inhalation, ingestion or absorption through the skin.

LOCATION OF HEALTH & SAFETY INFORMATION	MSDS for MS-222 is kept within the Laboratory of each Principal Investigator. Labeling: Containers with MS-222 shall have labels identifying contents, hazards, precautionary measures, and emergency contact information. Animals treated with MS-222 shall be identified with signs or cards on the tanks which have the appropriate hazard warning symbol (see above) and/or state: "Caution: animals treated with MS-222".
PROTECTIVE EQUIPMENT	Concentrated MS-222: To avoid inhalation, use in a well ventilated area for most applications. For large volumes, engineering controls to limit inhalation of fine crystalline powder is advised, including use of MS-222 powder within a class II biosafety cabinet or a fume hood. To avoid contact, eye protection, gloves, and protective outer garment are advised. MS-222 in water (tanks): HHS has determined under 21 CFR 25.33(a)(1) that water treated with MS-222 does not individually or cumulatively have a significant effect on the human environment.
WASTE DISPOSAL PROCEDURES	Concentrated MS-222: Waste must be in an airtight compatible container, labeled with a completed Dangerous Waste label, accompanied with completed Chemical Collection Request Form, and held until picked up by EH&S. Water treated with MS-222: Material can be drain discharged if the concentration of MS-222 is below 1% and the pH is between 5-9 at the Pullman campus. Contact local utility outside of Pullman for waste water disposal. Contact EHS for hazardous waste disposal beyond this pH range.
DESIGNATED AREA INFORMATION	Concentrated MS-222 is stored, weighed, and mixed within the PIs lab. Animals administered MS-222 are housed in IACUC-approved tanks.
DECONTAMINATION PROCEDURES	Upon Accidental Exposure: Eye or skin contact: flush eyes or skin with copious amounts of water; Accidental inhalation or ingestion: immediately seek medical attention and follow instructions on MSDS. Upon Accidental Release: If significant amounts of concentrated MS-222 are released outside engineered controls, immediately evacuate and secure area and contact EH&S. If a small amount of concentrated MS-222 is released, wear chemical resistant gloves and chemical splash goggles and limit airborne exposures by covering in absorbent material (i.e., paper towels), spraying with water, and removing to appropriate containers to be disposed of as hazardous waste (see above WASTE DISPOSAL PROCEDURES).