ANP Technologies, Inc. - NIDS ACE Test System

GENERAL DESCRIPTION:
The NIDS® ACE Test is an in vitro analytical test for the rapid qualitative detection of acetylcholinesterase-inhibiting pesticides, nerve agents, and heavy metals in water and food. Acetylcholine is a neurotransmitter that stimulates muscle contraction. In humans and other vertebrates, Acetylcholinesterase (AChE) is the enzyme that hydrolyzes acetylcholine, thereby regulating its levels. When AChE is inhibited, the excess acetylcholine causes the nervous system to lose control over the muscular system, resulting in convulsions, asphyxia, heart arrest, and death. Many pesticides, such as organophosphates, carbamates, and chemical warfare nerve agents, are AChE inhibitors. These classes of contaminants may be present in drinking water as the result of farm irrigation run-off where pesticides have been used or possibly by the intentional contamination of water by terrorist groups. The ACE Test is a quick method for the determination of possible water contamination by these classes of contaminants.

TECHNICAL DESCRIPTION:
The NIDS® ACE Test is based on the inhibition of acetylcholinesterase and other enzymes by pesticides and neurotoxins. Two different enzymes are used, Reagent A and Reagent B. Reagents A and B contain enzymes which have different reactivities with different acetylcholinesterase-inhibiting compounds. The reagents are lyophilized to ensure long term stability. A sample of water is introduced into a vial of Reagent A and Reagent B. A negative control composed of purified water is introduced into similar vials of Reagent A and Reagent B. The vials are mixed and allowed to react with any compounds present in the water. Acetylcholinesterase-inhibiting compounds in the water will deactivate one or both of the lyophilized enzymes. The negative control, which does not contain acetylcholinesterase inhibiting compounds, will not be deactivated. Samples from the test and control vials are introduced into designated wells on test tickets which contain filter pads that have been treated with a fluorescent substrate. The sample and control are allowed to react with the fluorescent substrate and then the level of fluorescent product in each well is measured by a reader. If the test sample contains acetylcholinesterase-inhibiting compounds, then the level of fluorescence in the test well will be significantly lower than in the control well in one or both of the tests.

CONTACT INFORMATION
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COST
• $10,000/system
• $20/analysis

Notes
This system is the core technology in the DoD's Water Monitoring System.

Survey Source
Vendor Supplied Information
System scores are compared across the four scenarios and ranked from highest to lowest.

**Evaluation Criteria**

**Throughput:**
- Between 15 and 30 minutes for detection
- Multiple samples, single tests/sample per run
- Less than 32 samples every 2 hours
- The system could be adapted to a semi-automated system with some effort
- Device or system is intended for multiple detection assays
- 2 solutions, buffer, eluents, and/or reagents
- 3 components
- Less than 5 minutes is required
- 6-8 steps are required for detection

**Logistics:**
- An afternoon of training and some technical skills required
- Approximately the size of a toaster
- Between 1 and 5 kg
- Wired connections are available
- System or device uses batteries
- 4-8 hours battery life

**Operations:**
- Can be used from 4 °C to 37 °C
- Components must be stored at room temperature (27 °C)
- Performance is not influenced by relative humidity
- Between 1 to 3 years shelf life
- 5-10 years expected life
- The system could be adapted to a fully autonomous system with significant effort
- The system software is closed and not available for modification
- The system hardware is closed and not available for modification

**Detection:**
- Possible the system could receive 510K clearance, no current efforts at this time
- Possible the system could receive FDA approval, no current efforts at this time
- Greater than 250 µL
- Excellent specificity. System has occasional false alarms under certain conditions (<2%)
- 1 ppb-1 ppm
- Possible system could identify aerosolized chemical agent
- System currently can identify liquid chemical agent