

MODERNIZATION TECHNOLOGY ASSESSMENT

MTA Number	MTA-MA-021
Title	
Reducing Costs Using Unmanned Aerial Vehicles (UAV) for Containment Inspections	
Description	
Historically, nuclear power plant personnel perform visual inspections of containment buildings and other large concrete structures using scaffolding, hanging platforms, or rappelling from the tops of these structures to gain access. These methods for accessing structure surfaces for inspection incur high safety risk for plant personnel, high costs, and large amounts of time to set up. Remote imaging using UAVs can be used to perform these inspections at the same level of accuracy without the drawbacks of typical manned inspections. Furthermore, the UAVs can carry different payloads to help identify defects dependent on the specific inspection needs. These inspection methods can fulfill ASME Section XI Subsection IWA and IWL (i.e., have the ability to perform VT-1(C) or VT-3(C) examinations with color distinction) dependent on camera type and distance from the object.	
Benefits	
Benefits Estimate	Level 1 – Savings are less than \$1 million per year, achieved through reductions in equipment leasing and personnel costs. Using a drone vendor or an internal program is expected to save \$100,000 to \$200,000 per implementation.
Benefits Description	• Reduction of cost to plan and perform external concrete inspections through reducing equipment required to provide access (e.g. building scaffolding, leasing cranes, etc.). • Reduction of time required to inspect the entirety of containment structures. • Increased plant personnel safety by allowing inspections to be done from a remote location using a UAV.
Costs and Schedule	
Cost	Level 3 – Implementation cost is less than \$1 million even if no previous drone experience or technology has been obtained. Using a drone vendor or implementation using an internal program are expected to be less than \$100K per implementation.
Schedule	Approximately 2-10 days to complete inspection. Planning and implementation is less than 6 months.
Scope Context	Per inspection of each site. This MTA assumes that the utility will either be using an external vendor or has an internal drone program.
Risks	
IT data risks are present when operating UAVs, such as automatic upload to an unsecure cloud. These risks can be mitigated by taking appropriate measures in selecting and setting up the UAVs. Any UAV flights taking place outside of plant structures must abide by FAA regulations (Federal and State). Standard project risks associated with implementing a new inspection method and potentially utilizing a contractor service at nuclear power plants.	

This MTA can be accessed from <http://www.epri.com/nuclearplantmod>. For more on MTA's please see EPRI product 3002017882.

Administrative Items	
Date	12/15/2020
Functional Area Where Benefits Will Be Realized	Maintenance Quality Control
Reference Implementation Guidance	Remote Visual Inspections with Unmanned Aerial Systems (EPRI 3002013193) Field Guide: Visual Inspection of Concrete Structures in the Nuclear Fleet (EPRI 3002007799)
Industry SME	EPRI - Samuel Johnson Contact: NuclearPlantMod@epri.com
Previous Implementation	Please contact EPRI for implementation examples and contacts.
Implementation Enablers	N/A
SWEEP Score	• Cost – Level 3 – Utilizing the services of a vendor or starting internal drone program will both cost less than \$1 million. • Savings – Level 1 - Savings achieved through the reduction of inspection costs are expected to be less than \$1 million per utilization. • Payback – Level 3 – Based upon estimated cost and savings information, the payback period would be within one year or immediate on execution. • Licensing Readiness – Level 3 – This technology has already been implemented at nuclear power plants and satisfies all ASME Section XI requirements. • Technology Readiness – Level 3 – The technology is commercially available, has already been used at commercial nuclear sites, and is ready for wide operational deployment. • Implementation Proficiency – Level 3 – The implementation of UAV inspections does not require any special knowledge. However, any outdoor drone inspection requires the pilot to have an FAA Part 107 license.
Applicability	All reactor types All geographic regions
Keywords	Remote visual inspection; personnel safety; UAS; unmanned aerial vehicle (UAV); containment inspection; drones
Business Case Analysis Cross- Reference	N/A

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