

**ASSIGNMENT: ICS AND SCADA**

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23SS\_INFO\_2123\_HSA – Intro to SCADA Security

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June 13th, 2023

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I had no experience or knowledge of ICS and SCADA prior to enrolling in 23SS\_INFO\_2123\_HSA. If all goes well, this will be my last class before graduating in the cyber security program. Coming into the summer quarter, I am motivated to dedicate myself to the material and really dive into understanding not only the context but also be prepared for the implementation of ICS and SCADA systems in critical infrastructure. Being completely green to this area of cyber security has captivated my interest and sparked my curiosity, as all the material that has been covered is brand new.

During the first week of 23SS\_INFO\_2123\_HSA I decided to research SCADA and ICSs role in the natural gas industry. The reason I chose to research the natural gas industry is for two reasons. The first being my relationship with my uncle who is a co-owner of a land surveying business. A large portion of his clientele are companies in the natural gas industry. The second reason is that Northern Natural Gas, a natural gas pipeline company with an office in Omaha, hires cyber security and SCADA professionals. They currently have several job postings for System Administrators and Operations Technology System Analysts with varying levels of expertise (*Northern Natural Gas Company - Job Opportunities*, n.d.).

At the start of my research, the very first document I found was a warning letter from the PHMSA (Pipeline and Hazardous Materials Safety Administration). PHMSA is part of the U.S. Department of Transportation. On their website, their mission statement clearly identifies the overall objective of the agency, "PHMSA's mission is to protect people and the environment by advancing the safe transportation of energy and other hazardous materials that are essential to our daily lives. To do this, the agency establishes national policy, sets and enforces standards,

educates, and conducts research to prevent incidents. We also prepare the public and first responders to reduce consequences if an incident does occur.” (*PHMSA’s Mission | PHMSA* (n.d.)).

According to section 2 of the warning letter PHMSA issued Northern Natural GAS, “Northern Natural failed to properly test any backup SCADA system as least once each calendar year, but at intervals not to exceed 15 months.” PHMSA cites federal code 192.631, Control room management (4) Test any backup SCADA systems at least once each calendar year.

Northern Natural Gas was granted a warning by PHMSA and a timeline to fix their non-compliance. If they did not meet the timeline a steep fine would be imposed each day, “Under 49 U.S.C. § 60122 and 49 CFR § 190.223, you are subject to a civil penalty not to exceed \$218,647 per violation per day the violation persists, up to a maximum of \$2,186,465 for a related series of violations. For violation occurring on or after November 27, 2018 and before July 31, 2019, the maximum penalty may not exceed \$213,268 per violation per day, with a maximum penalty not to exceed \$2,132,679. For violation occurring on or after November 2, 2015 and before November 27, 2018, the maximum penalty may not exceed \$209,002 per violation per day, with a maximum penalty not to exceed \$2,090,022. For violations occurring prior to November 2, 2015, the maximum penalty may not exceed \$200,000 per violation per day, with a maximum penalty not to exceed \$2,000,000 for a related series of violations. We have reviewed the circumstances and supporting documents involved in this case, and have decided not to conduct additional enforcement action or penalty assessment proceedings at this time. We advise you to correct the item(s) identified in this letter. Failure to do so will result in Northern Natural Gas being subject to additional enforcement action.”

Understanding the impact that an exploited vulnerability in critical infrastructure is the first step towards an organization beginning to strengthen their security posture. In *Protecting the Nation's Natural Gas Pipeline SCADA Infrastructure: Focus on Cybersecurity*, the AGA (American Gas Association) tries to guide organizations towards that first step by providing a high-level overview of SCADA systems role in the Natural Gas industry and strategies to consider when implementing SCADA and ICS into an industrial environment such as natural gas mining operations and pipelines. "The first step in establishing a comprehensive, robust cybersecurity program is the development of a security policy that accounts for operational system criteria and limitations." Security awareness, specialized training, hiring talent, and overall implementation of introducing defense-in-depth and zero tolerance can be daunting for an organization but there is a lot to lose if something goes wrong.

The potential for disaster if a SCADA and ICS system does not operate in the natural gas industry is high. On September 9<sup>th</sup> of 2010 a huge explosion occurred in San Bruno California devastating a neighborhood and killed eight people along with injuring 58 people. San Francisco abc7 news wrote an article in 2020 on the anniversary of the tragic day, " This year marks 10 years since the explosion and fire that killed eight people, injured 58 and destroyed 38 homes." (KGO).

The San Bruno explosion is a somber reminder that the enforcement of compliance on natural gas systems can truly make a life-or-death difference in a disaster scenario. Agencies and organizations such as the PHMSA and AGA strive to prevent incidents such as these and protect our nation's natural gas pipeline SCADA infrastructure. If a remote shutdown system had been installed prior to September 9<sup>th</sup> 2010, innocent lives wouldn't have been lost along with the destruction caused to the city and the money for repairs. It wasn't until after this incident that a

remote shutdown system was installed. “It took PG&E 95 minutes to turn off the gas that was fueling the fire. The utility has since installed a remote shutdown system.” (KGO).

Accountability is necessary, on an individual level, for all those involved in this industry, from executives to those remotely operating natural gas pipelines and those onsite using HMIs (Human Machine Interfaces) to prevent tragedy from happening. It is also necessary for organizations to be held accountable after an incident occurs, but more importantly before an incident occurs. By proactively imposing impending consequences such as the PHMSA did on Northern Natural gas, organizations can begin to strengthen their security postures and mitigate risk. The cost otherwise is just too great. “PG&E was fined \$3 million for violating the Natural Gas Pipeline Safety Act in 2017.” (KGO). 3 million dollars will never be able to repair the damage occurred in San Bruno. The U.S. government and Natural Gas companies across the nation are taking steps to secure America’s critical infrastructure.

## Reference

KGO. “State Lawmakers Review PG&E 10 Years after San Bruno Fire.” *ABC7 San Francisco*, 13 Oct. 2020, abc7news.com/san-bruno-fire-state-senate-explosion-pge/6994040/.

*Northern Natural Gas Company - Job Opportunities*. (n.d.). Midamerican.taleo.net. Retrieved June 13, 2023, from <https://midamerican.taleo.net/careersection/10060/moresearch.ftl>

*PHMSA’s Mission | PHMSA*. (n.d.). [Www.phmsa.dot.gov](http://www.phmsa.dot.gov). <https://www.phmsa.dot.gov/about-phmsa/phmsas-mission>

*Protecting the Nation’s Natural Gas Pipeline SCADA Infrastructure: Focus on Cybersecurity*. (n.d.). Retrieved June 13, 2023, from <https://www.aga.org/wp-content/uploads/2022/11/SCADA-Protections-Review-AGA-June-2012-Final.pdf>

Treat, R. (n.d.). *SCADA AND TELEMETRY IN GAS TRANSMISSION SYSTEMS*. Retrieved June 13, 2023, from [https://asgmt.com/wp-content/uploads/2016/02/109\\_.pdf](https://asgmt.com/wp-content/uploads/2016/02/109_.pdf)

*WARNING LETTER VIA ELECTRONIC MAIL TO*. (2021). Pipeline and Hazardous Materials Safety Administration (PHMSA). [https://primis.phmsa.dot.gov/comm/reports/enforce/documents/320211001W/320211001W\\_Warning%20Letter\\_02112021\\_text.pdf](https://primis.phmsa.dot.gov/comm/reports/enforce/documents/320211001W/320211001W_Warning%20Letter_02112021_text.pdf)