ABSTRACT
There is a need for instantly indicating, easy-to-read, and relatively inexpensive ionizing radiation casualty dosimeters for first responders and members of the general public. One such dosimeter is the RadTriage™ colorimetric dosimeter. In this research we use digital scanning methods to read the RadTriage colorimetric dosimeter cards. The tests performed in this research were used to verify the responsiveness of RadTriage cards across the manufacturer’s specified range, 50 mSv to 4000 mSv. Tests were also performed at incremental doses below the manufacture’s specified range to determine if application of the digital scanning densitometry method allows for a more systematic, quantitative readout with a greater dynamic range. The results from this comparison suggest that both types of dosimeters, thermoluminescent and colorimetric, had strengths and weaknesses. RadTriage cards are able to be handed off rapidly without pre-testing, they allow for real-time indication of doses above a threshold, they are inexpensive, and they can be read visually and by commercially available digital scanners.

CHAPTER 6: RESULTS

Figure 6.1: RadTriage Response as a Function of Dose. The observed response is plotted with vertical error bars indicating variation in response among cards and horizontal error bars, which are too small to be visible, indicating variation in dose based on initial calibration analyses. An exponential fit is also plotted with the data. The fit had a chi2 P-value of 0.998 which suggests very little residuals in the difference between the observed values and the values expected based on the fit function.

CHAPTER 8: CONCLUSIONS: SUMMARY OF FINDINGS
Recommendation to Governmental Agencies with First Responders

The results of this research indicate that RadTriage cards could be a good tool to provide for routine use by emergency first responders. RadTriage cards are able to immediately indicate dose to personnel that may have minimal knowledge of radiation detection and dosimetry. At the same time, this research has shown that they could be used post hoc with a common, flatbed scanner and a publicly-available image...
processing software to get a reasonable dose estimate. ….. Based on these results, governmental agencies and other first-responder coordination organizations should consider investing in RadTriage cards, especially when faced with cost limitations that would otherwise prevent dosimeter dispatching.

Beyond utility for first responders, RadTriage cards may be useful to members of the general public who are concerned about possible radiation exposure. The cards could be placed around the house in case of an emergency; after an emergency, or an expected exposure, the person in possession of the RadTriage cards could measure dose relatively easily without any special equipment. While this would result in a positive outcome if it means that citizens begin to grow more invested in understanding their radiation dose, it could also create a problem if citizens mishandle their cards and become alarmed over a resulting false positive.