

Abstract Submitted  
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**Development of Water Target for Radioisotope Production<sup>1</sup>**

NATHAN TRIPP — Ongoing studies of plant physiology at TUNL require a supply of nitrogen-13 for use as a radiotracer. Production of nitrogen-13 using a water target and a proton beam follows the nuclear reaction  $^{16}\text{O}(\text{p},\text{a})^{13}\text{N}$ . Unfortunately the irradiation of trace amounts of oxygen-18 within a natural water target produces fluorine-18 by the reaction  $^{18}\text{O}(\text{p}, \text{n})^{18}\text{F}$ . The presence of this second radioisotope reduces the efficacy of nitrogen-13 as a radiotracer. Designing a natural water target for nitrogen-13 production at TUNL required the design of several new systems to address the problems inherent in nitrogen-13 production. A heat exchanger cools the target water after irradiation within the target cell. The resulting improved thermal regulation of the target water prevents the system from overheating and minimizes the effect of the cavitations occurring within the target. Alumina pellets within a scrubbing unit remove the fluorine-18 contamination from the irradiated water. The modular design of the water target apparatus makes the system highly adaptable, allowing for easy reuse and adaptation of the different components into future projects. The newly designed and constructed water target should meet the current and future needs of TUNL researchers in the production of nitrogen-13.

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