

## **Material Transfer Report**

**Submitted by**

**Ideal Source Quality Assurance, LLC**

**License number 24-32675-03E**

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This report itemizes topaz gemstones, morganite and diamonds transferred for use under 10 CFR §30.14 for the calendar year 2024.

a) Type and quantity of material transferred:

The current NRC license issued to Ideal Source Quality Assurance (ISQA) has been modified from its predecessors to change the statistical basis under which irradiated gemstones are approved for release in the U.S. by focusing on the risks to human health as well as explicitly including topaz, diamonds and morganite in the list of gemstones covered by the license (as well as implicitly other gemstones with similar impurity profiles). During 2020 we started to develop a new data base (fully implemented in 2021) that allows for a more comprehensive tracking of tested stones from testing all the way through manufacture to delivery to wholesale distributor of finished gemstone jewelry. This data base was described in last year's report, but we include it here with additional commentary at the end of this report. We believe the issue it raised merits reiteration .

In 2024 ISQA conducted test sessions on behalf of 22 unique customers These included tests performed for Ostro Minerals on old inventory previously released from the Maria reactor and approved using the criteria in the earlier license. While most customers submitted only one type of stone for testing, a few sent shipments with stones of more than one type (in separate packages). Names and addresses of customers are considered confidential business information.

**Topaz:** 191,964 cts.

Approximately 90 percent of the topaz (TOP-1) released was treated by and in the possession of Ostro Minerals (aka Topaz Minerals). Many of these stones had previously been released under the old license as part of the statistical procedures and stored. All stones in storage including those not released earlier had been subject to Ge testing by which their U.S. release dates had been calculated. However, many of these stones had been re-cut and/or polished and consequently we decided to retest all of the goods prior to release.

Of the remaining 10%, approximately half were sky blue (TOP-2) and had not been subject to neutron irradiation. As expected these stones showed no measurable activity. The remaining darker blue stones (TOP-3) were the product of treatment at sites of unknown provenance and were subject to increased care in the testing. In all cases activity well below the NRC exempt limits was observed.

**Diamond 7,836 cts**

Diamonds were supplied for testing by a number of customers. These included some stones which were identified as treated in the U.S. and the remainder from irradiation at sites unknown to ISQA. Both natural and “lab-grown” diamonds were submitted for testing. As expected, no measurable activity was seen in any stones of any type or origin, indicating that only electrons had been used for the color treatment.

**Morganite 28,768 cts**

Cut and polished morganite were submitted for testing by a number of customers. Interestingly, all morganite samples arrived packaged one piece per bag, which significantly complicated the testing process, since only a small number of bags could fit into the testing stations at one time. The only measured activity above background was in the form of <sup>134</sup>Cs which was occasionally reported in the analysis but never exceeded 1 Bq/g. All of these stones were approved for release.

ISQA maintains records of all tested parcels, reflecting the type of stone and at a minimum the total mass of each shipment. These computerized records are generated by the testing programs. More detailed records of the breakdown of the individual shipments are contained in test request forms (TRF) as spreadsheets provided to ISQA administrative offices prior to testing. These TRFs are ultimately input data for the data base previously described and are permanently stored. Paper certificates are no longer issued. Rather, the certification is tracked through the data base with SKU and P.O.. information following every parcel through its ultimate processing.

b) At the time of introduction of the byproduct material, the topaz gemstones in category (TOP-1) were the property of:

Ostro Minerals U.K. LTD

77-79 Charlotte Street  
W1T 4PW, London  
United Kingdom  
ph. 44 20 3011 4994  
harlotte Street,  
London, W1T 4PW

And of distributors acting on behalf of Ostro.

Ostro Minerals is the successor company to Topaz Minerals AG, previously located in Zurich Switzerland. It remains under the Ostro family control after the death of its owner and founder Max Ostro, in May 2010.

The remainder of the tested stones were submitted by 22 distinct customers. No effort was made to establish the origins or treatment histories of these stones. For diamond and morganite the near absence of activity implies that such information is of no particular value in assuring the safety of the stones upon release of the stones in the U.S. As mentioned above, dark blue Topaz of unknown origin (TOP-3) was subject to extra scrutiny typified by the use of samples smaller than those usually employed for testing of stones treated and released by the Maria Reactor (NCBJ) in Poland.

c) Because of the geological nature of the topaz gemstones, the initial concentrations of byproduct material varied both with respect to the origin of the gemstones and within gemstones from a single origin. After an initial decay period, during which the short-lived byproduct materials were not characterized, the principal isotopes were  $^{54}\text{Mn}$ ,  $^{182}\text{Ta}$ ,  $^{46}\text{Sc}$ , and  $^{58}\text{Co}$ . Traces of  $^{134}\text{Cs}$  and  $^{65}\text{Zn}$  were also detected in a small minority of stones. Activities of the main isotopes varied from zero to a few hundred Bq/g. A few outliers, easily detected in the sorting procedure, may even have  $^{182}\text{Ta}$  concentrations exceeding 1000 Bq/g. Decay time for each individual parcel was determined by the initial concentration of these isotopes.

As was the case in 2020, the change in license procedures and the interruption of testing created a state in which many stones were “old” with nearly undetectable activity. No new “shipments” from Maria (typically consisting of 1 million or more carats) were released. At the time of transfer of topaz from TOP-1, the average activity of these gemstones was (typically),  $^{54}\text{Mn} \leq 2$  Bq/g and  $^{182}\text{Ta} \leq 1$  Bq/g. The activity of the other isotopes was less than 1 Bq/g. In general, the average sum-of-ratios for each parcel was less than 0.1, i.e. 10% of the levels allowed by NRC regulation. More recently irradiated stones were also tested and in all cases the sum-of-ratios was found to be less than 1, and in most cases was less than 0.5. Records maintained by ISQA (as well as at the irradiation facility) provide the average activities for each individual parcel of stones, as determined by high resolution Ge counting on the testing date, from which later activities can be calculated. The ISQA tests of selected parcels, using NaI(Tl) detection, are in excellent agreement with the Ge testing in Poland. Detailed records of the testing results are maintained by ISQA and in the “cloud”. No new shipments, released on the basis of statistical sampling from a large number of parcels, occurred in 2022. A limited number of small parcels were released to Bangkok from Poland on the basis of Ge testing. Any such stones were retested using the Bangkok station at the time of sale.

Reports of material transfers will be maintained permanently at ISQA headquarters. Reports of the average activities for all parcels shipped from Poland under the ISQA license will also be maintained (on computer and on hard copy or data storage device) in the ISQA office or the cloud. Reports of all parcels tested will be preserved in similar form.

At the time of transfer, activities of diamond and Morganite were negligible. Trace amounts of <sup>134</sup>Cs were occasionally observed in morganite, with quantities never approaching 1 Bq/g. Activities of sky-blue topaz (TOP-2) were also negligible. For darker blue topaz (TOP-3) the activity of submitted stones was found to be low, indicating that these stones had likely been circulating for some time between their release from the treatment center and their cutting and polishing prior to submission for testing by ISQA. We suspect that many, if not most of the stones in category TOP-3 were treated as rough stones and only cut after an order had been placed for color-matched special cuts. The average SOR for these stones, while not as low as those in TOP-1 were typically less than 0.5.

#### **Addendum: Comments on stone tracking data-base**

We previously described the functionality of our stone tracking data-base (included below for completeness). It has been in use for nearly 4 years and is currently being accessed by a major jewelry wholesalers, well known for supplying “high-end” retail jewelry chain stores. Its use enables them to buy multiples of any item from multiple manufacturers while assuring that all irradiated stones contained in those pieces have passed testing. We are aware of blue topaz jewelry for sale in other outlets, in quantities that appear to far exceed the number of carats “approved for release” by other NRC licensees and for which no robust proof of testing is available. I am personally aware of one customer who maintains separate inventories of morganite; those that have passed ISQA testing and those for use for less demanding customers. The testing process we employ adds to our and the customer’s costs but protects the public from unscrupulous or ignorant distributors and sellers. We strongly advocate that the NRC require a similarly robust tracking system for all exempt gemstone licensees.