67.

CU-U MINERALIZATION IN THE MARCH FORMATION PALEOZOIC ROCKS OF THE OTTAWA-ST. LAWRENCE LOWLANDS

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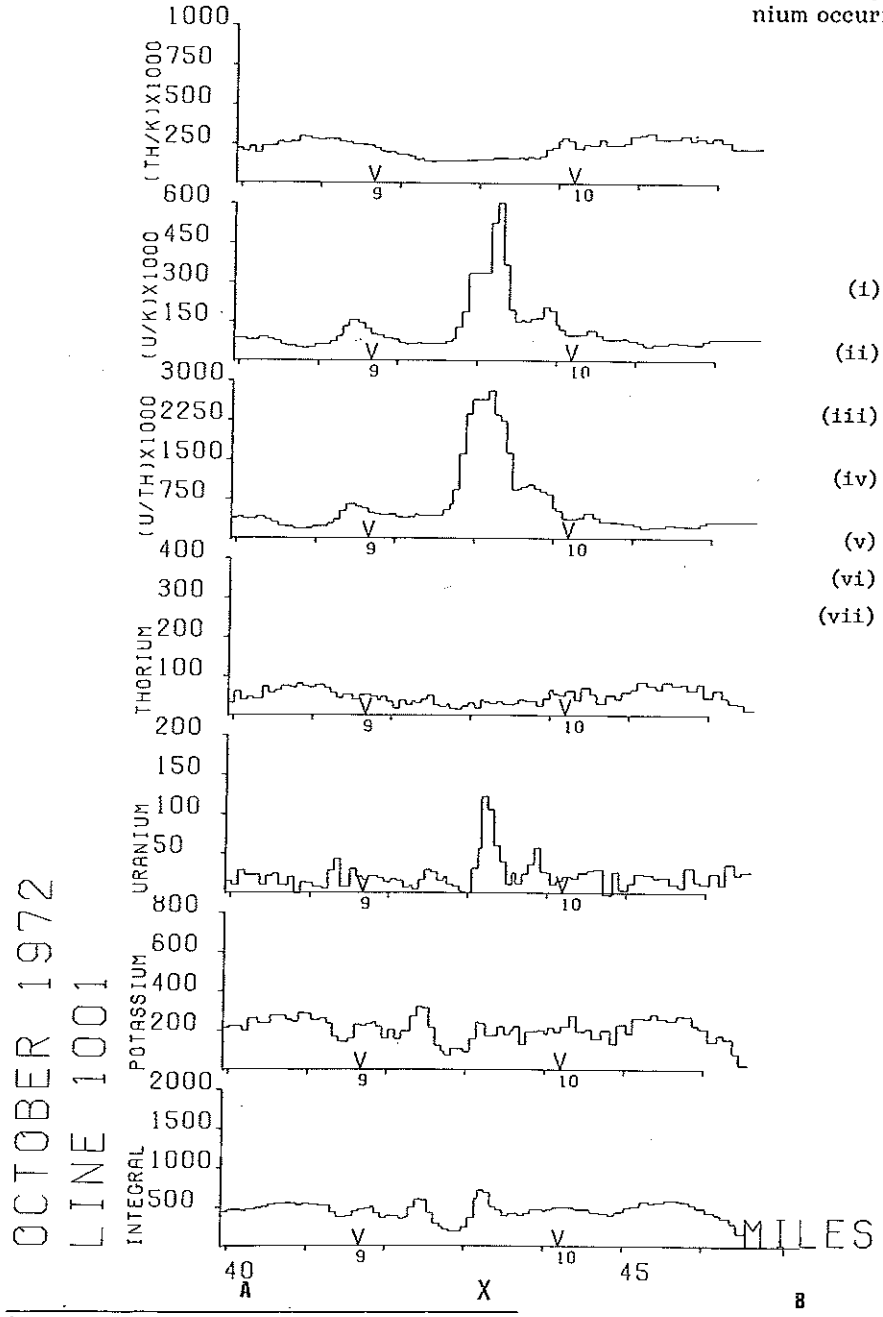
Certain aspects of the geology, mineralogy and geochemistry of an area of copper-uranium mineralization in the March Formation Paleozoic sedimentary rocks of the Ottawa-St. Lawrence Lowlands have been described in three previous papers (Grasty *et al.*, 1973; Jonasson and Dyck, 1974; Steacy *et al.*, 1973). The airborne radioactivity anomaly which led to the original discovery of the mineralization described is shown in Figure 1; the geology and the location of the mineralization is shown in Figure 2 by an X along the airborne profile, A-B. By virtue of its proximity to Ottawa, this area has proved convenient as a training ground for students and foreign visitors, as well as having considerable geological novelty insofar as Canadian uranium occurrences are concerned.



(i) Integral counts per 0.5 sec (0.41 to 2.81 MeV)

(ii) Potassium counts per 2.5 secs (1.37 to 1.57 MeV); 1% K ≈150 counts

(iii) Uranium counts per 2.5 secs (1.66 to 1.86 MeV); 1 ppm eU ≈24 counts

(iv) Thorium counts per 2.5 secs (2.41 to 2.81 MeV); 1 ppm eTh ≈9 counts

(v) Uranium/thorium counts

(vi) Uranium/potassium counts

(vii) Thorium/potassium counts

Figure 1.

Original airborne γ-ray spectrometry profile A-B over South March Cu-U occurrence.

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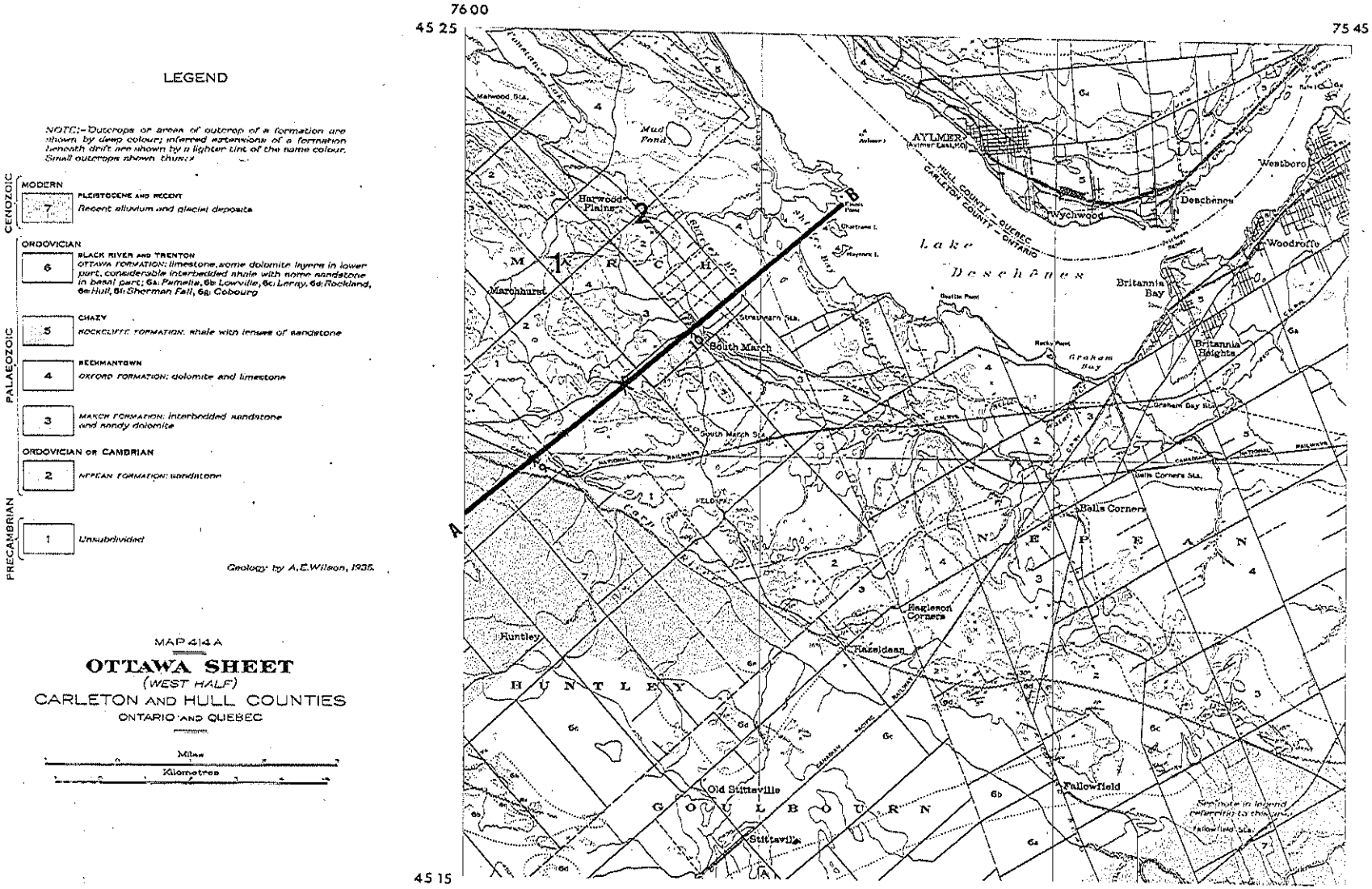
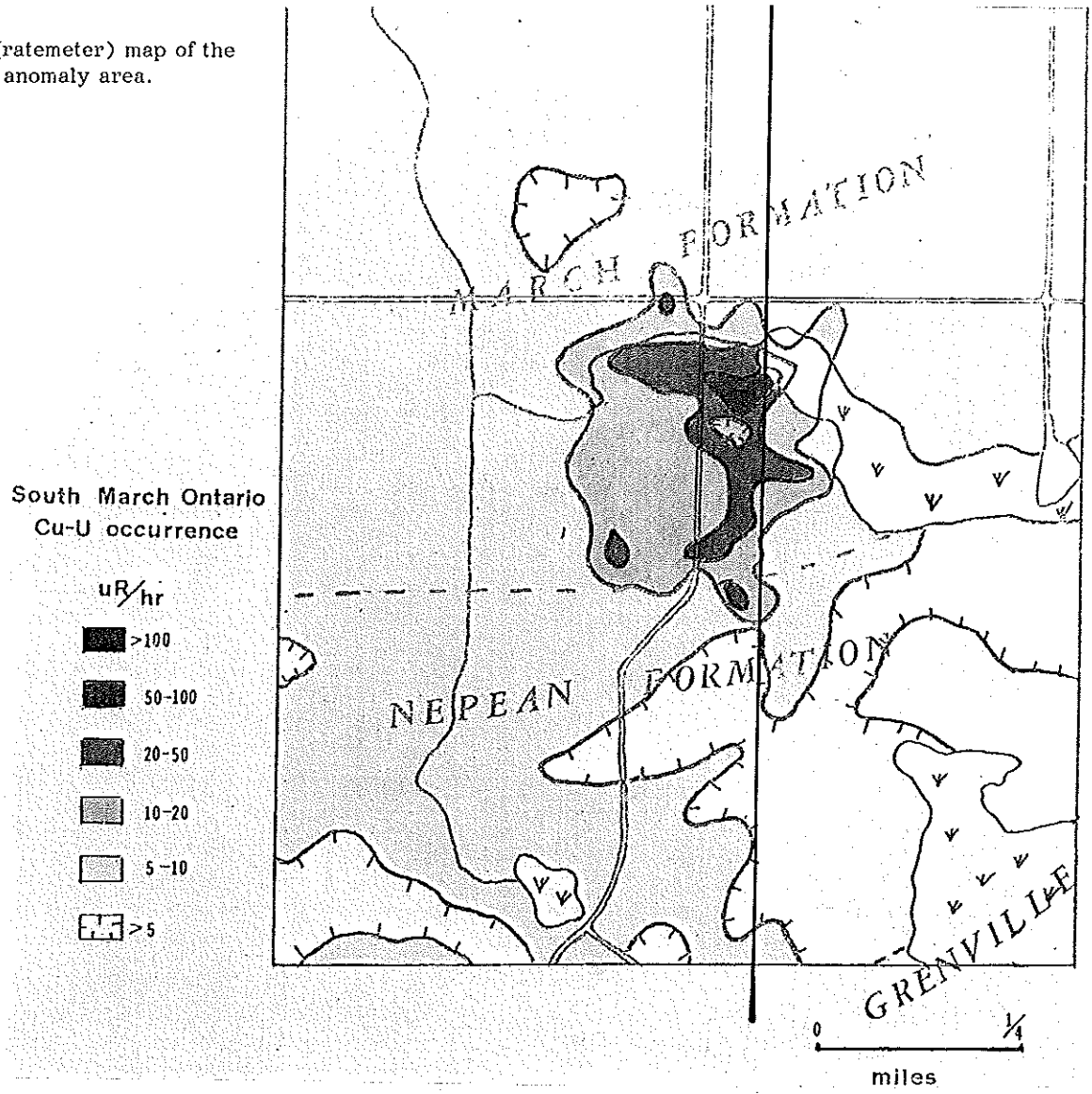


Figure 2. Geology of the area around South March showing the position of the original airborne γ-ray spectrometry profile A–B and the South March occurrence X and two new occurrences; 1. Marchhurst, 2. Shirley's Bay.

Figure 3

Total count (ratemeter) map of the South March anomaly area.



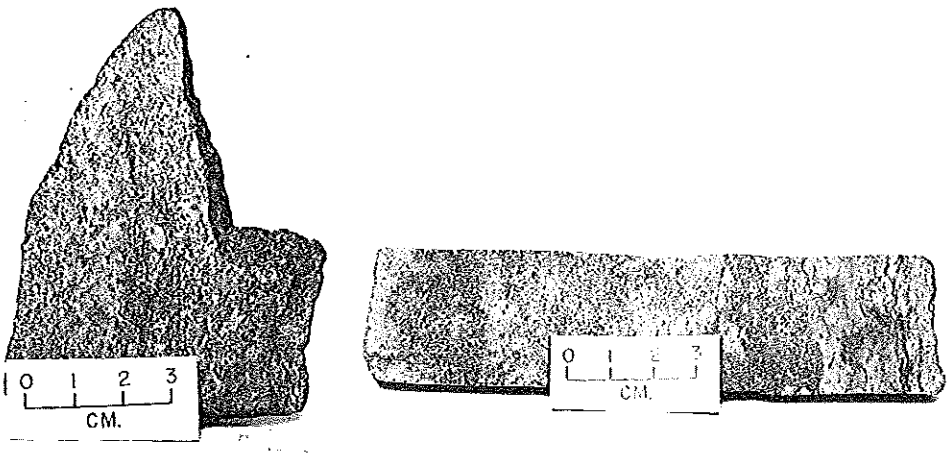


Figure 4

Photograph of a piece of drill core and of a hand specimen showing chalcopyrite (bright patches) and thucolite (black specks) in a particularly rich sample.

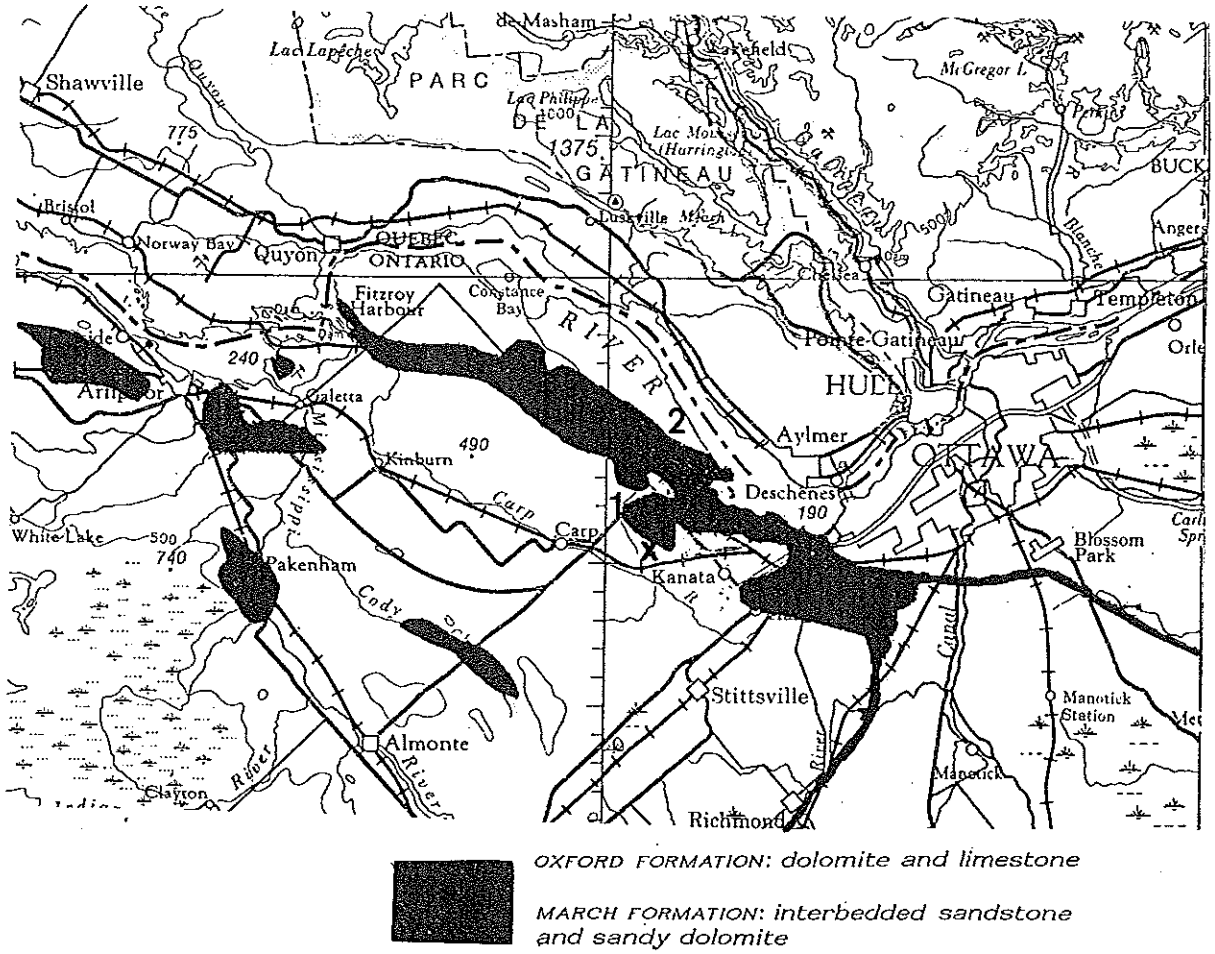


Figure 5. Area covered by stream sediment and water geochemistry late in the summer of 1974. Location of South March Cu-U occurrence X as well as two new occurrences; 1. Marchhurst, 2. Shirley's Bay.

During the summer of 1974 a considerable amount of detailed ground work has taken place at the South March locality. This work has been organized on a grid with 100-yard station spacing and 50-yard spacing in the vicinity of the anomaly, covering a total area of approximately one square mile. In total some 360 stations were occupied. Scintillometer (ratemeter) readings were taken at each station along with field γ-ray spectrometer readings which enabled the production of ratemeter (total count), K, U, Th, U/Th, U/K, Th/K maps. In addition soil samples were taken, nominally from the "C" horizon, at an approximate depth of one foot for U, Cu, Pb, Zn analyses. The detailed nature of the anomaly is illustrated by the ratemeter (total count) map, Figure 3 along with the position of the original γ-ray profile A-B. As described previously (Grasty *et al.*, 1973) the radioactive zone trends some 2,000 feet perpendicular to the geological strike, is about 500 feet in width and lies entirely within the March Formation. The maximum values in the core of the anomaly, 200 μR/hr, are some 40 times greater than local background radioactivity. All these values are on overburden rather than bedrock, and the bedrock values would be expected to be greater. The centre of the anomaly covers an area some 150 yards by 100 yards. Slightly higher overall radioactivity is noted in the March Formation than in the underlying Nepean Formation, Figure 3. The γ-ray spectrometry at ground level revealed that the radioactivity is mainly from uranium with negligible contribution from thorium. This is consistent with the airborne profile (Fig. 1).

Some shallow drill sampling of bedrock (6 to 12 inches), under about 1 foot of soil cover within the centre of the anomaly, has been completed. The rocks are sandy dolomites with up to 4% chalcopyrite (visual estimate) and .05% U_3O_8 (calculated from field readings) in the form of thucolite. The average concentrations are much lower than this and could not be estimated without deeper systematic drilling. The mineralized zone may strike to the north under barren rock. Figure 4 is a photograph of a piece of drill core and of a hand specimen showing chalcopyrite and thucolite in a particularly rich sample. The Cu-U mineralization is emplaced in sandy lenses within the dolomite. The age of the mineralization has not yet been established. The mineralization may have been

emplaced by fluids during or shortly after diagenesis or at a much later date (Grasty *et al.*, 1973; Steacy *et al.*, 1973).

Further examination has taken place along the March Formation and two additional zones of Cu-U enrichment (chalcopyrite and thucolite) have been located. These approximate positions are shown on Figures 2 and 5 as localities 1, 2 along with South March X. Further work is planned in these areas. While apparently not as strong as the concentration at South March, these additional localities are significant in that they imply a regional nature to the distribution of the mineralization.

Figure 5 shows as well an area investigated by stream sediment and water geochemistry and by radon sampling of water wells to outline further zones of Cu-U mineralization. These data have not been fully assessed but it appears that some zones of increased Cu-U have been outlined for follow-up. The radon investigations were carried out under the direction of W. Dyck of the Geological Survey. The outlining of this type of mineralization by geochemistry has already been illustrated (Jonasson and Dyck, 1974). Additional airborne γ-spectrometry is planned over the Ottawa-St. Lawrence Lowlands to investigate the regional concept of the mineralization in the March formation.

The above work will be described and evaluated as it becomes available, but it would certainly seem likely that additional Cu-U targets will be outlined for investigation within the March formation. The combination of the Cu with U makes this type of mineralization doubly interesting economically and it also facilitates its detection by airborne geophysics. The possibility that the concentration of Cu may not always be coincident with U should be kept in mind.

In conclusion, work to date suggests that the March Formation constitutes a definite focus of interest for an unusual type of Cu-U mineralization.

References

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