COSMOGENIC RADIONUCLIDES IN DIFFERENT FRAGMENTS OF PORTALES VALLEY. G.Bonino1, G.Cini Castagnoli1, C.Taricco1, N.Bhandari2 and M.Killgore3, 1Dipartimento Fisica Generale, Università, Via Giuria 1, 10125Torino, Italy and Istituto Cosmogeofisica, CNR, Corso Fiume 4, 10133Torino, e-mail: BONINO@PH.UNITO.IT, 2Physical Research Laboratory, Ahmedabad 380009India, 3Southwest Meteorite Laboratory, PO Box 95, Payson, Arizona, 85547.

The Portales Valley meteorite shower fell on 13 June 1998, in New Mexico. About 50 specimens ranging from 12g to 34kg have been recovered [1]. This meteorite has been classified as H6 [2]. Portales Valley consists of large silicate-rich regions crosscut by thick veins of metallic Fe-Ni [3-6] of different sizes and abundances.

Due to the availability of several fragments with different metal veins contents, Portales Valley gives an unusual opportunity for detailed evaluation of the production rate of the cosmogenic radioisotopes produced from the interaction of Galactic Cosmic Rays (GCR) with the main target elements Fe and Ni and of the shielding effects for the same radioisotopes. However the evaluation of the bulk chemical composition becomes more complicated.

We are measuring the cosmogenic radionuclides in different fragments in the underground laboratory of Monte dei Cappuccini in Torino. We are using two gamma-ray spectrometers: 1) a highly selective Ge-NaI(Tl) system; 2) a HPGe detector for very low background, with high efficiency. The second spectrometer is used for larger fragments. We completed the measurement of a fragment weighing about ~600 g, performed in the Ge-NaI spectrometer, while measurements of a second fragment of ~900 g and of a third fragment of ~1800 g are in progress.

The measurements of the first fragment started on 3 August 1998. Twelve cosmogenic radioisotopes have been measured with high precision: 48V(T1/2=16.1d), 51Cr(27.7d), 7Be(53.4d), 39Co(70.8d), 56Co(73.3d), 44Sc(83.85d), 57Co (270.02d), 59Mn(312.2d), 22Na(2.6y), 60Co(5.27y), 44Ti (59.2y), 26Al(7.2x107y). This measurement lasted 9.5 million seconds to obtain a suitable counting statistics of the low activity of 44Ti which is useful for studying the effects of the century scale solar modulation of GCR [7, ]

We use the inherent 40K concentration in the meteorites for determining the effective efficiency of counting for each fragment [8]. The K and Fe, in the chondritic portion of the first fragment were measured at the Joint Research Centre of E.U., Ispra-Italy in 7 different samples. The K concentration ranges between 597 to 609 ppm with an average value of 603 ppm. The Fe concentration in the same samples ranges between 250 to 278 mg/g with an average value of 266 mg/g. Measurements in the second and the third fragments, together with those of several other elements in the three fragments are in progress.

The cosmogenic radioisotopes which are produced by GCR interactions also in the metal veins render higher concentration, in particular in the second fragment, with respect to the usual H6 ordinary chondrites. We consider here the activity ratio 22Na/26Al since these isotopes are produced in similar targets and nuclear reactions and therefore the ratio is nearly independent of meteoroid composition and shielding, but it is sensitive to time variation of GCR. In Portales Valley 22Na/26Al=1.53 reflecting the enhanced GCR flux during the minimum of solar activity during transition of solar cycles #22-23.

Preliminary analysis of the measurements in progress on fragments 2 and 3 are consistent with the 22Na/26Al ratio measured in the first fragment. This value is very similar to those that we measured in Torino(H6) and Fermo(H3/5) which fell in 1998 and 1996 respectively, roughly during minima of the solar cycle. While in Mbale(L5/6), fell in 1992, during the maximum of solar activity (minimum of GCR), we found 22Na/26Al=1.24. These results confirm that Torino, Fermo and Portales Valley, at least in their final stage of exposure, were exposed to similar GCR fluxes. While Mbale was exposed to lower fluxes.

Other results are in progress.