Radioisotope Dating

Radioisotope dating is a **little** more scientific than the above sedimentary rock dating methods. These methods, which include those such as uranium-lead, rubidium-strontium, rubidium-strontium isocron, and potassium-argon, are those which date igneous or metamorphic rocks, meaning these rocks were once in a molten state and solidified into a solid one. Only rocks in the “millions of years old” category can be dated by these methods.

Let’s assume we find a piece of lava to date. A geology professor would send it to a lab to grind it into powder, isolate the minerals, measure the amount of elements in the powder and punch the figures into a computer. A number of tests would produce a range of dates varying in millions of years. Now a necessary question is asked: "Where did you find this rock?" “Just below a limestone layer.” This reply dates the rock. What happened to all of the other dates varying in age that were received from the number of different tests? They were thrown out because they did not fit the time scale allowed in order to be located below a limestone layer. For example, because one date may have been 600 million years old, it was thrown out because that was too old to be in a limestone layer. Other dates of around 100 million years old were thrown out because they were too young to be in a limestone area. As soon as you tell the man dating the rock where it was found, a general idea of the age of the rock is conjured up in his head. Now one only needs to date the rock to verify what you expected. Again, we have circular reasoning, where the dating methods depend entirely upon the theory of evolution. Most labs will not even date rocks unless they know where these rocks were found.

To explain further, let us look at the process in more detail. All of the dating methods are under the same assumption but simply use different elements. One dating method is the uranium-lead method. Uranium is a radioactive element which degenerates gradually into lead (less complex atoms) at a presumably known rate, which we will discuss in greater detail later. All methods assume that at the time a molten rock becomes a solid it should date at zero, having no lead in it at all because the newly formed uranium has not had time to decay. For example, a molten piece of lava solidifying makes a rock zero days old, since it contains all uranium and no lead. Uranium is said to have a half-life of 4.5 billion years, meaning that it would take 4.5 billion years for half of the current uranium to decay into lead. For example, a rock with a pound of uranium (exaggerated figure) at the moment of solidification would have no lead, but 4.5 billion years later, would contain half a pound of uranium and half a pound of lead. Now I should mention that the uranium does not decay directly into lead, but rather goes through a number of changes from U-238 to Th-234 to Pb-234 to U-234 to Th-230 to Ra-226 to Rn-222 to Po-218 to Pb-214 to Bi-214 to Po-214 to Pb-210 to Bi-210 to Po-210 and finally to Pb 206. The change from U-238 (parent) to Pb-206 (daughter) is the complete process, or half-life of 4.5 billion years.

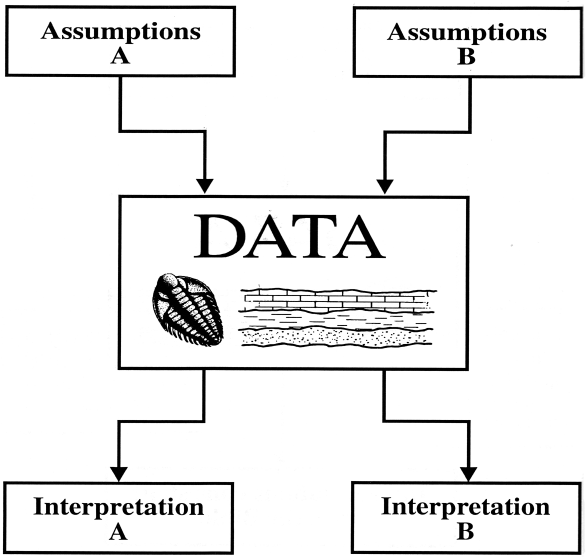
In order to accept these dating methods, a number of assumptions are involved, the first one being a constant decay rate. This means that the rate of decay at a 4.5 billion year half-life has never changed in the past; that uranium- 238 has never, for any reason, begun to decay a little faster or slower. Scientifically, we do have evidence to question this, which we will look at soon, but for now I am going to let the evolutionists have this assumption. I don't believe there has ever been a rock that has seen a complete half-life go by, but nonetheless we will, for now, assume the rate is constant.

The second assumption is far more serious and is one in which the creation model dominates. This assumption states that there is no loss or gain of the parent (uranium-238) or daughter (Pb-206) material, meaning at no time in the history of the rock has any uranium or lead (or any intermediates, some of which are highly-mobile gases) been added to or taken from this rock. Well, when an evolutionist goes to find a rock to be dated, he takes great care to try to find a rock that has not been contaminated. Guess what contaminates rocks? WATER! Yes, water will leach in or leach out these materials at

random, thereby causing results to be inaccurate. Remember our lava we had dated where only one date was chosen out of many? The way they justify throwing the other dates out is by claiming that they were contaminated. Creationists hold that very few rocks would have been untouched by the ground breaking, mountain-covering deluge of Noah's Flood. Andrew Snelling writes concerning the undetectable contamination of rocks:

> . . . the U/Pb system, including its intermediate daughter products, especially Ra and Rn, has been so open with repeated large scale migrations of the elements that it is impossible to be sure of the precise status/history of any piece of pitchblende selected for dating. Even though geochronologists take every conceivable precaution when selecting pitchblende grains for dating, . . .no one could be sure that the U and Pb they are measuring is 'original' and unaffected by the gross element movements observed and measured . . . In addition, the pitchblende grains don't have uniform compositions so that 'dating' of subsections of any grain would tend to yield widely divergent U/Pb ratios and, therefore, varying 'ages' within that single grain . . . the evidence clearly indicates that these dates are meaningless (Snelling, uranium pp. 44-57).

The third assumption involved in this process states that there are known amounts of daughter present at the start. This means that we assume we know for sure that when lava solidifies it has ZERO lead in it. This should be a fairly easy assumption to put to the test with all the volcanoes that are erupting, and have erupted, all over the world. Sunset Crater in northern Arizona is known to have erupted about 900 years ago. We know this from Indian artifacts found in the rocks formed by the eruption, as well as from tree ring dates and the stories left by the Indians who lived near this volcano; all confirm the same time. However, when the dating methods were applied to this volcano, dates ranged from 210,000 to 230,000 years old (Dalrymple, pp. 47-55). The explanation for this erroneous result was that there was too much argon. What kind of explanation is that? Another example comes from the Kaupelehu Flow, Hualalai Volcano, in Hawaii. We know this volcano erupted in 1800-1801 but dating methods (12 dates) show a range from 140 million to 2.96 billion years (Funkhouser, pp. 4601-4607). Again, no suitable explanation is given. Finally, one more example (though there are hundreds more) comes from the Grand Canyon's volcanic flow, which occurred after the canyon was formed because the lava runs down the side of the canyon walls. Some dates of this 'young' lava flow date older than the oldest rocks in the Grand Canyon (Morris, Young Earth, p. 59).



Our bias determines how we interpret data. If my bias is Noah's Flood, the earth is

One other problem with this dating method concerns the atmospheric conditions of the pre-Flood world (more detail in later chapters). For our purposes here, one needs

only to realize that the evidence suggests cosmic radiation in the past was much lower. Assuming this to be correct, the radiation levels in the rocks could have been much lower, thereby making this dating method useless. In fact, scientists have now discovered that there are 14 different radionuclides which have had their decay properties changed by temperature, pressure, electric fields, and magnetic fields, all of which have been different in the past (Sippert, Evolution, p.247).

It seems the dating methods are flawed and that it all depends upon our bias. If we believe in Noah's Flood, the rocks are contaminated, if we don't we still have other assumptions to get past. To sum up radioisotope dating, if you have rocks of a known age, radioisotope dating doesn't work. However, if you have rocks which you have no idea how old they are, radioisotope dating works every time.

Because of evolution and the assumptions (denials may be a better term) involved, I believe we are closer to the end times than we ever have been. I know that sounds like a common sense type of statement, but let me explain. II Peter 3:3-6 states:

> You must understand that in the last days scoffers will come, scoffing and following their own evil desires. They will say, 'Where is this coming He promised? Ever since our fathers died, everything goes on as it has since the beginning of creation.' But they deliberately forget that long ago by God's Word the heavens existed and the earth was formed out of water and by water. By these waters also the world of that time was deluged and destroyed.

Note that it says "in the last days" two things are going to take place: 1) scoffers will say everything goes on as it has since the beginning of creation, and 2) people will willingly deny Noah's Flood. The first assumption is that the past is the key to the present, sometimes referred to as uniformitarianism. This theory was not made popular until the mid 19th century, yet we read here that it will be in the last days. Regarding the denial of the Flood, again this is something made popular only in the past 50 years. Why the change in attitude? Evolution! Evolution and the pseudo science that comes with it has fooled the nation into believing the earth is millions of years old. In order to believe in the dating methods described above one must: 1) Deny Noah's Flood and, 2) say that all things go on unchanged since the beginning of creation (4.5 billion year half-life is steady). Indeed, man will go to great lengths to avoid worshipping his Creator. The evidence stares us in the face, yet we deny God's mighty hand in all that He has done. The truth is that Noah's Flood would have deposited most of the fossil bearing record we have today and contaminated the rocks as well. Evolutionists deny this fact, but if the Flood was a global event as the Bible teaches, there is NO evidence for evolution or an old earth.

"God saw all that He had made and it was VERY GOOD" (Genesis 1:31). God created a wonderful world at the beginning but now, "we are looking forward to a new heaven and a new earth, the home of righteousness" (II Peter 3:13). What happened to "very good?" Now we are waiting for "very good" to come about. The answer is found in the third chapter of Genesis, where the earth is cursed in verse 17, animals in verse 14, plants in verse 18, humankind in verses 16, 17, and 19, and now death reigns (Romans 8:19-22). The Bible clearly teaches that things have not gone on as they have since the beginning because, "the wages of sin is death, but the gift of God is eternal life through Jesus Christ our Lord" (Romans 6:23). If this is false, as evolution teaches, and if death is not a result of our sin, then Christ is not our deliverer from our sins or eternal damnation. But I know that evolution is false and the message in Romans 6:23 is true, and Christ is my Redeemer who lives now and forever, AMEN!!!! To God be the Glory!

Further Examination of the "Assumptions"

Before leaving this topic, I would like to dive a bit deeper into the assumption of the decay rate being the same throughout time for those who are more technical. We know that the dating methods have been flawed and contradicting evidence has proven that they cannot be trusted. As described above, we know that water contaminates rocks so Noah's Flood would have ruined a dating method or two. Second, dating rocks from known volcanic eruptions prove the methods are inaccurate. Third, in order for the dating methods to work we must assume a constant decay rate of the elements being measured. Research has shown that this assumption, which has been accepted as truth for years, has now been proven wrong. Granite samples from deep within the earth have shown that rocks at deeper levels increase in temperature. Likewise, the rocks in deeper levels date older than those at the top using conventional dating techniques. Though at first, this seems to support evolution, new evidence has shown that this is consistent with science and a young earth. What has been found is that elements have had an accelerated decay rate in the past. Though not fully understood as to why, the evidence showing it to be true is seen in a number of areas. One such evidence is seen in the helium leaking out of rocks. No one had ever measured the rate at which helium escaped from rocks until a group of creation scientists did so recently. Taking this measured escape rate and applying it to the amount of helium found in rocks of all levels of the earth, it revealed the earth to be about 6000 years old. It also showed that in the same time that 6000 years worth of helium escaped, 1.5 million years (according to evolutionary, uniformitarian principles) of uranium decayed. This would mean that the decay rate of uranium had to be much faster in the past. Five separate studies have confirmed this to be the case and that the helium escape rate is accurate. In fact, evidence has shown that 1.5 supposed million years of uranium could actually decay in a matter of just a few days. Therefore, rocks only weeks apart in age would give conventional dates that are millions of years apart. With a decay rate that is tremendously faster than previously presumed, this means that the rocks formed at the beginning of the Flood (lower layers of the earth) would still date older than those towards the end of the Flood (upper layers of the earth) that lasted an entire year. This same evidence also will prove that granite rock had to have formed and cooled within days, not millions of years as evolutionists have claimed.

First of all let me review how the dating methods work in greater detail. Each element is made up of atoms with the same number of electrons and protons for each specific element. However, the neutrons vary in each of these atoms. We call the atoms with different neutron numbers isotopes. This is why we have carbon-14, carbon 12 etc. because they are different carbon isotopes. When there are too many neutrons they are unstable so they give off particles, a process which is called radioactive decay. The decaying isotope is called a parent and the new element that it forms is called the daughter. We discussed earlier how Uranium gives off particles and eventually turns into lead and potassium turns into argon etc. There are a number of different elements that are radioactive and can be used for these dating methods, but in all cases the process and the assumptions involved are the same. To help understand this process imagine a huge tank of water above your head representing the parent element of uranium. Now underneath this large tank is a 50-gallon bucket representing the daughter element of lead. Now this huge tank above has a tiny hole in it and is dripping water into the 50-gallon bucket. We measure the amount dripping and notice that every single minute one-gallon of water drips. With the dating methods this is called the decay rate. Uranium is said to have a half-life of 4.5 billion years. Again, this means that in 4.5 billion years 1/2 of the Uranium will decay into its daughter element of lead. Just as we can measure the rate at which water is dripping we can measure the rate at which uranium "drips" into lead (our 50 gallon bucket). Therefore, if I would leave the room in which my water bucket is placed and come back some time later I could go to the bucket and see how much water is in it to see how long I have been gone. If I see 35 gallons of water in my bucket and I know water is dripping one gallon a minute (representing my half-life) I know that I have been gone for 35 minutes. Likewise, if I see 1/2 uranium and 1/2 lead in a rock I know

the rock is 4.5 billion years old. The problem with this science is that there are assumptions that must be believed in order for this method to work. Again, we must assume that the amount of parent element (like uranium) and daughter element (like lead) are known to begin with. It is believed that as soon as a rock becomes a solid, there is no daughter element there because there has been no time for it to accumulate from the parent element yet. In the example of the tank of water, this is assuming that we know for a fact that before we leave the room there is absolutely no water in the 50 gallon bucket.

However, we see that there are huge observational problems with this assumption because no one was there to see that rock form and measure the amount of parent/daughter atoms there were. This assumption seems to be proven wrong simply by looking at volcanoes of known eruption dates from our history. As noted earlier, when we date rocks of known ages the dating methods give dates hundreds of thousands to millions of years off. One of hundreds of examples, beyond those already mentioned, is Mt Saint Helens. The lava dome which is less than 25 years old, dated .35 million to 2.8 million years old. Basalt from Mt Etna in Sicily from an eruption in 122 BC dated 250,000 years old. An 1801 Hawaiian volcano dated 1.6 million years old, another one from Hawaii erupted in 1959 yet it dates 8,500,000. Mt Etna also erupted in 1964 yet the dating methods reveal it was 700,000 years ago.

No wonder that in 1770 George Buffon said the earth was 70,000 yrs old. In 1905 they said 2 billion, in 1969 3.5 billion, and today 4.6 billion. This means the earth is aging 21 million years every year or 40 years a minute. Yet despite all this, unlike the dating methods, the Bible has never changed and true science supports it to be accurate.

Remember the assumption that no contamination has occurred, despite the fact that we know water will leach in or out elements from a rock? In fact, when rocks are put in distilled water, up to 80% of potassium is taken out of a rock in just 4 1/2 hours. If water contaminates rocks, wouldn't Noah's Flood mess up the dating methods? In our example of the tank of water, what if someone came into the room while you were gone and poured out their cup of water into the bucket when you weren't there to see it? The fact is, it is well known that rocks do get contaminated, which is why a geologist goes through great care to be sure the rock hasn't been near water before dating it. This is also why they must deny Noah's Flood as a global flood, because that would contaminate the rocks as well. This explains why many of the dates given for rocks are not published, because they don't fit the evolutionary time-line. They justify this by just chalking up the discrepancy to contamination. In essence, this system is set up to make sure the theory of evolution is supported, because anything that doesn't support it, is cast out and ignored.

The other assumption of a constant decay rate, however, is where creationism really shines. We have only measured this decay rate for about the last 100 years, yet they assume this decay rate has been the same for billions of years. What if your tank of water had a piece of sand stuck in the hole plugging it up for a time? What if the pressure of water caused the water to leak out more at the start, but it slowed down as the pressure lessened? Again, all of these assumptions are accepted in order for the dating methods to work for evolution, despite, as you will see, evidence to the contrary. It is evidence to this assumption of a constant decay rate to which we will now focus.

The RATE Research project done through the Institute for Creation Research has shown that the decay rate of these elements were indeed much faster in the past then they are today. This being true, radioactive dating can't be trusted today. Let's examine the evidence to show the dating methods inaccurate. First, as researchers studied tiny zircon crystals, astonishing evidence of rapid decay rates were seen. One of the byproducts of uranium decaying into lead is helium. In fact for every uranium atom that decays, 8 helium atoms are produced. In examining these zircon crystals that contain uranium, the RATE group was able to measure the amount of helium atoms within it. Near Los Alamos, New Mexico there was a lot of deep drilling done for geothermal energy research. While drilling they went through granite layers that can be seen in the core layers. Examining the granite they took out zircon crystals and dated them using the

conventional methods, showing them to be about 1.5 billion years old. However, they also discovered that the deeper the rocks were the higher the temperature was and the less helium present in the zircons. At 750 meters deep there was still 80% of the helium left in the rock (only 20% had leaked out). This is important because it revealed that the hotter the rocks were the faster the helium had escaped. The following graph shows the findings:

Depth in Meters		Temp. C	Helium%
750-	95-	80	
960-	105-	58	
1035-	124-	42	
2170-	151-	27	
2900-	197-	17	
3502-	239-	1.2	
3930-	277-	0.1	

Before the helium measurements from the zircon were done it was predicted that the leak rate of helium would be equal to the amount of helium lost, divided by the time. In other words, with the creation model the earth is about 6000 years old, therefore, you would divide the amount of lost helium by 6000 years. However, the evolutionary model had dated these rocks to be 1.5 billion years old. Both theories could not be correct, someone was wrong. If the 6000 year date was true that would mean in order to still have 80% of helium in the rocks it would have had to leak out rather quickly, but if the 1.5 billion year date was true, the helium would have to leak out very, very slowly to lose only 20% of it in that time. So does helium leak out quickly or slowly? Up to the time of the RATE project, no one had ever measured the rate at which helium leaks out. Before the experiments were made they published their predictions of helium leakage based on a 6000 year-old earth, which was 100,000 times different than the evolutionary prediction was. The results showed that the rate of observable leakage fit the 6000 year-old earth, exactly as predicted. In other words, the granite, which was earlier dated by uranium decay to be 1.5 billion years old, showed the same rocks to be only 6000 years old based on helium leakage rates. How can these two methods disagree by millions of years? This suggests that the uranium decay rate was much faster in the past because 1.5 billion years of uranium somehow decayed in just 6000 years or less.

As the RATE team continued to research, other evidence continued to surface which supported the accelerated decay rate of uranium as well. The four main radioisotope dating methods are potassium/argon, rubidium/strontium, uranium/lead, and samarium/neodymium. Ironically, when dating rocks they usually only use one or sometimes two of these methods on the same rocks. Why? Because they assume that all of them should give the same date, so why waste the time and money doing multiple methods. However, the fact is, when the RATE group decided to use all four methods on the exact same rock samples, they showed all four methods gave radically different results. They even used the more widely accepted isochron method in which they used up to 20 different rock samples to make sure these weren't accidental results. For example, the diabase sill rocks from the Grand Canyon dated as follows:

Potassium/Argon = 841.5 million years
Rubidum/Strontium 1,060 million years
Lead/lead 1,250 million years
Samarium/Neodymium 1,379 million years.

The Cardenas Basalt from the Grand Canyon dated as follows:

Potassium/Argon = 516 million years

Rubidum/Strontium 1,111 million years
Samarium/Neodymium 1,588 million years.

The Brahma Amphibolites layer dated as follows:

Rubidum/Strontium 1,240 million years
Lead/lead 1,883 million years
Samarium/Neodymium 1,655 million years.

The Elves Chasm Granites dated as follows:

Rubidum/Strontium 1,512 million years
Lead/lead 1,933 million years
Samarium/Neodymium 1,664 million years.

From the above data we see that the same rocks dated vastly different depending on the method. This in itself shows the dating methods are quite flawed. However, there are interesting patterns that were shown in this data as well. Each of these rock units used in the dating represented a single geological event that formed the layer and should date the same, but clearly did not. For example, the Cardenas Basalt showed that the potassium/argon decay rate had to be quick for the 516 million years suggested, while the rubidium/strontium decayed faster showing 1,111 million years, and the samarium/neodymium decayed even faster yet through the 1,588 million years given. This suggests that each of these dating methods must have a decay rate that was different during the same period of time. Potassium, rubidium and samarium all showed different decay rates than what are currently recorded for their half-lives.

We also see from the data that the potassium methods always gave younger dates than the others while the samarium dates were always older (For the more technically minded, the alpha decay was always older than beta decay methods). This data corresponds with the half-life ages as well. In other words, the shorter the half-life as stated today, the slower it seemed to decay, which gave older ages for the rock. Likewise, the atomic weight of these elements showed the heavier atoms always gave older dates, probably because of the nuclear forces, which bind the atoms together, are very different. The only way to reconcile this information is to understand that decay rates have not been constant in the past.

Before we explain why the decay rates have changed, we must finish looking at other evidence supporting it. When examining these zircon crystals a number of fission tracks were seen. When a uranium atom simply decays it ejects particles in alpha radiation. However, with fission, instead of particles coming off, the atom itself splits in half and then the two atomic halves fly apart from each other, damaging the zircon crystal. This is why inside the zircon crystals we can see a visible fission track which is the damage done by the atoms flying apart, almost like a scratch. By counting the number of tracks, one can actually use this as a dating method as well. By examining fission tracks at Peach Springs Tuff in Arizona, the conventional dating (using assumed decay rates), showed the rocks to be 21 million years old. Going further down in the strata there is the Morrison Formation in Utah with all of the dinosaurs. The fission tracks there equaled 136 million years at today's accepted decay rate. Going further down to the bottom of the Grand Canyon to the Tapeat Sandstones it was up to 500 million years of decay. Therefore, the rocks on top dated 21 million years old, in the middle they dated 136 million and at the bottom 500 million. This fits the idea given by evolution that the deeper you go the older the rocks are. However, the Bible indicates that all these layers should be about the same age and were deposited in the Flood. So how does this evidence fit the creation model? We will explain why they give different ages the deeper you go

later, but for now just realize that one possibility is that the decay rate was accelerated during the Flood.

One more support of increased decay rate in the past is seen in granite layers that have polonium radiohalos. Most granite contains a black, flaky mica mineral called biotite. Inside the biotites there are zircons with uranium atoms inside them as well. When uranium decays into lead it doesn't go directly into lead. In fact, there are 8 different steps where particles are ejected before it is turned into lead. Each step is sometimes recorded in the rocks when we have larger zircon crystals because the particles that are ejected don't go far enough to escape out of the crystal, and what remains is a decay signature. The ejected particles become stray electrons, which then become helium atoms. If the zircon crystals are tiny, the ejected particle shoots out of the crystal into the surrounding biotite flakes. Each particle is like a bullet with different power. Just as a pistol shell won't go as far as a rifle shell, each alpha particle ejected goes a different distance leaving a number of visible rings. When uranium decays it leaves 8 rings from each of the eight different steps involved in the decay process. A fully formed radio halo has about 500 million to a billion alpha particles that have decayed in order to leave a signature strong enough for us to see. According to standard decay rates today, that many alpha particles decaying would take about 100 million years. Therefore, these halos are interpreted to be at least 100 million years old. In many places around the world we see these halos in granite, however, there are areas with more of them than others. We will explain how the Floodwaters caused this when we discuss polonium halos later. For now, we must first realize that granite was not a created rock, but rather something that formed after the flood. Evidence of this can be seen where granite intrudes into fossil bearing sedimentary rocks, so it would have to have formed after the sedimentary rock did. Since sedimentary fossil bearing rock was deposited by the Flood and granite is sometimes found intruding through it, some granite at least, had to form during or after the Flood.

Secondly, in some granites you find only one, two or three ring halos that match the last three elements in the 8 step decay chain of uranium. (Remember each element has a certain energy given off in its decay and ejects that exact same distance away from the center each time). These three rings come from polonium halos and are found in granite around the world. Since polonium comes from one of the 8 steps in the uranium decay process, this means the uranium and polonium halos must have formed at the same time. The problem is that polonium has a very short half-life, depending on the type it ranges from 164 microseconds to 138 days, while uranium has a half-life of 4.5 billion years. Since the secular world is dating this granite to be 100 million years old, this would mean at least 100 million years worth of uranium would have had to decay in the same time this polonium did in a blink of an eye. Just as seen in earlier data of helium decay rates, these elements are giving inconsistencies.

A final evidence of this increased decay rate in the past can be seen from carbon-14 dating. Now radiocarbon dating is different than the radiometric dating methods already discussed, because it can only date things that were once alive. When cosmic rays from the sun collide with the nitrogen atoms in the atmosphere it turns the nitrogen into carbon-14, which is radioactive. Everything that breathes takes in this radioactive carbon and when they eat plants or animals they are taking that carbon into their body as well. However, once this living thing dies, it stops taking in the carbon-14 and that carbon then begins to decay and leave the body. Because carbon-14 has a half-life of only 5730 years, you can't date anything to be millions of years old with this method due to the fact that it would all be gone in that amount of time. All of the carbon would decay in less than 100,000 years. This is a problem for evolutionists because even in secular literature we find many examples of fossils that are supposed to be millions of years old, yet still having radiocarbon in them. For example, dinosaur bones have dated to be only 34,000 years old yet they are supposed to have gone extinct about 65 million years ago. Coal from a 250 million year old layer of earth dated 33,700 years old, and wood from a 120

million year old layer dated 42,390 years old. These are just three of many examples showing this dating method is flawed as well.

Because of this inconsistency in carbon-14 dating, the RATE project took ten coal samples, three of which were supposed to be 34-55 million years old, four of which were to be 65-145 million years old and three which were to be 299-318 million years old. Though no measureable carbon should be left to be found in this coal, the carbon dating showed that all ten samples had about the same amount of radiocarbon in them, suggesting the trees that formed this coal all lived at the same period of time. This is exactly what the Bible would indicate in that they were buried in the Flood of Noah about 4500 years ago. The RATE group went a step further and carbon dated 6 diamonds that were supposed to be 1-3 billion years old. Again, there shouldn't be carbon-14 left, however, they all contained large measurable amounts of radiocarbon, showing they couldn't be very old either. (Keep in mind diamonds come from deep within the earth where there shouldn't be any contamination). This, too, suggests that the decay rate of radiocarbon was accelerated in the past, just as it was for uranium, potassium and others, but just not as much.

Most of the problems with radiocarbon are actually explained by a different environment before Noah's Flood. Creationists believe science supports that fact that we were protected from the radiation of the sun prior to the Flood. Less radiation would mean less C-14 in the atmosphere (because radiation can't hit the nitrogen to turn it into C-14) and less radiocarbon in anything living at that time. Therefore, any living thing that died in the Flood would have little radiocarbon in it already. This would give older dates when dating it today because it would look like much of the C-14 has disappeared in decay, when in fact, it was never there to begin with. So what does this all mean for us as creationists? If decay rates were vastly accelerated before the Flood, then the radioactive ages of today would give us incorrect dates, however, they still could give us the correct order of their deposition during the Flood. In other words, a layer formed at the beginning of the Flood would have much more decay than a layer deposited at the end of the Flood. If we could find out what the accelerated decay was, we could perhaps correct the current methods, but at this point that is not possible.

Let's go back to the polonium halos because there we will find interesting explanations for why we are seeing what we do. Most granite contains the black flaky mineral called biotite, which is embedded with zircon crystals that form early on in granite formation. As described earlier, most zircon crystals are very small and the alpha particles actually burst out into the nearby biotite with different energies, leaving a spherical energy ring called a radiohalo. The most energetic ring is from polonium 214, which becomes the outermost ring. Dr. Robert Gentry is best known for researching this years ago, however, some of his conclusions are being challenged by what the RATE program has discovered. Gentry believed that granite must have been the created rocks of God since the polonium half-live was 164 microseconds. What this would mean is that in 16.4 microseconds all of the polonium would be gone. Gentry interpreted this as seeing that granite would have to form in a blink of an eye, because if granite was molten as evolutionists had proposed, the energy signatures would not have been recorded in the rock.

Fireworks can be used to illustrate this. When the alpha particle decays it gives off energy like a firecracker placed in mud. The energy given off by the explosion leaves a mark in the mud, however, if the firecracker was placed in water, the energy signature would not be preserved. Therefore, Gentry concluded granite was formed immediately upon God's speaking it into existence, and when the short-lived polonium "blew up," it left the energy signature in solid rock, not molten magma that wouldn't preserve the energy signature. However, since we find granite intruding through fossil bearing rocks as discussed early, this means the granite formed after the fossils were laid down and the granite could not be one of the first foundations of God's creation. So how do we get these halo's preserved if Gentry was incorrect? Remember, just one tiny alpha particle

giving off energy would not leave enough of a signature to be seen. This is why it takes 500,000 alpha particles to make the ring, which according to today's standards should take 100 million years, but we know today's standards of decay rates are not correct. Though Gentry believed all of the decay had to happen instantaneously, the RATE group has shown that this could take place in a matter of days during the Flood, as polonium would continue to accumulate in the same place. Let me explain.

To understand this we first need to ask a question. Since polonium is a rare element, where did it come from in the biotite? Remember, the source of polonium is in the zircon at the center of the uranium halo. (Polonium is a byproduct of the uranium decaying). So how do you get the polonium from the uranium in the zircon crystal to get outside of that crystal into the biotite where the halo was produced? As we said earlier, since the source of uranium is in the zircon crystals, this means the uranium and polonium halos had to form at the same time. Since this is a bit technical I will repeat myself one more time. Remember that polonium is a byproduct of the uranium decay, but the very slow uranium decay must produce enough polonium for 500 million alpha particles (which would take 100 million years of uranium decay according to secular standards today) to produce just one radiohalo BEFORE the polonium decays in microseconds. How?

A second question is why wasn't the carbon-14 or polonium decay rates accelerated like the potassium or uranium was? As the evidence in the Los Alamos drilling showed (graph towards the beginning of this section), the shorter the half life the element has, the less the acceleration it showed. In other words, the slower the decay rate of an element, the greater the acceleration, and since polonium has such a fast decay rate, there wasn't the acceleration. Likewise, carbon-14 has a relatively short half-life, and thus, it would not have much acceleration either. Most of the carbon-14 dating discrepancies are due to the lower radiation levels before the Flood causing lower radiocarbon levels in living things that died at the time of the Flood.

In order to answer the first question of where the polonium came from in biotite crystals we must remember that the zircon crystals and the polonium halos are found in the same microscopic sheets. Most people don't realize that granite, in its molten state, contains up to 24% of its volume as dissolved water. Therefore, when granite crystalizes, any water not contained in the crystal is free to move around, as are many other elements like copper. This water can easily move through these biotite plates that are loosely compacted together. We also know that radiohalos can only form below temperatures of 150 degrees Celsius. This was evidenced in the drill cores from Los Alamos, which showed that the radiohalos disappeared in the granite layers that were at depths that reached that temperature. We also know that uranium halos form around these tiny zircon crystals, and that in the process of uranium decay, both radon and polonium are formed. (In the eight-step decay process, after uranium reaches radon, the radon decays into polonium). Just like helium, radon is an inert gas and is free to move about upon its formation. If radon leaked out to the surface of the zircon crystal and then decayed to polonium, the polonium is now available to the hot waters flowing between the biotite layers. We know water did flow through these layers because biotite that comes into contact with hot water is discolored and we see these discolorations in granite formations containing halos.

So in summary, the uranium decay produces the radon which moves to the surface, then when it decays into polonium, the polonium is washed away a short distance by the hot water. The chemical properties of polonium shows that it loves chlorine and will bind to it easily. This is important because a common component in salt water and volcanic rocks is chlorine. Therefore, as the chlorine in the water flows past the polonium, it easily bonds with the chlorine and is taken by the water to a nearby site (usually less than 1 mm away from the uranium). In fact, new research is revealing that the center of polonium has salt in it, supporting this explanation. This, therefore, is the solution to Gentry's problem of how the polonium could all be in one place. Once the

polonium decays, it leaves behind the chemical condition (salt) able to grab the next polonium atom flowing by in the water and the process repeats itself, all decaying in one place, leaving behind a polonium halo, not that formed instantaneously, but one that forms over a matter of days as polonium is snagged by the hot waters slowly carrying it between the biotite layers.

Further evidence of this is seen in that there are empty "bubbles" at the centers of nearly all Polonium halos. Also, granites that have evidence of greater volumes of hydrothermal fluids, show greater numbers of polonium halos in them as well. In other words, the more fluids there were, the more polonium captured, the more halos formed. Putting this together we see another important point in realizing that polonium and radon have very short half-lives. This means they would have to survive long enough to be captured by the fluids and carried to the biotite, which had to be cooler than 150 degrees Celsius for the halo to form. This in turn means granites had to cool within days, not millions of years. In testing this theory, the RATE group went to the Smoky Mountains of Tennessee where abundant sandstone, containing zircon crystals, exists. This sandstone was formed by water and the clay in the area contains biotites. This, therefore, provides the three necessary conditions for these halos to form. The zircon provides the uranium, the clay produced the biotite host and the sandstone was evidence of the needed water.

As one looks in a mineral deposit there are different zones that can be seen to evidence how it formed. For example, in one area there are garnets that had formed in the sandstone. As you go a bit further we see an area with the mineral staurolite, and going further almost to North Carolina we see an area containing kyanite. This shows there were metamorphic reactions under different temperatures and pressures when this layer formed. Staurolites form with a high concentration of water, and in that area there was a much larger concentration of polonium halos. This fully supports the theory of hydrothermal events being the cause of these polonium halos. Further, we often see large pink feldspar crystals in granite where these halos are found. These feldspar crystals form when large volumes of hydrothermal fluids are present, which is again, needed for polonium halos to be created. Other field research has continued to support the creationist's prediction that the halos would increase in granite deposits that have high concentrations of hot water. In fact, granites believed to be formed during the flood have shown much higher concentrations of halos than granites that evidence less water present.

All of this information could be helpful in other ways as well because it is possible that it may help us find mineral deposits. Those areas of high halo concentrations are proving to also have had high ore deposits. The Cornwall granite in Britain contains high amounts of tin, copper and lead-zinc ore deposits in fractures from hot water. Likewise, the Mole granite in Australia is high in halo concentration, and veins containing tin and tungsten. Remember, when granite crystalizes, any water not contained in the crystal is free to move around, as are many other elements like copper etc. Therefore, knowing the areas in which there were high concentrations of hot water and polonium halos present, may be evidence of where ore deposits will be found. Further research will need to be done in this area.

In conclusion, we see the following: Hot water is a key to answering why we see polonium halos in granite. Radiohalos provide evidence that 100's of millions of years worth of decay could happen in a matter of days. Radiohalos provide evidence that metamorphic rocks formed and cooled in just days. Radiohalos provide a potential key in finding ore deposits. Radiohalos show the current dating methods to be flawed due to accelerated decay rates.