SATURN OPS

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https://saturn-ops.com/

Saturn**:** the 6th planet from the sun; a gas giant about 80% the diameter of *Jupiter*.

--In mythology *Saturn* is the Roman god of wealth and agriculture. The Greek equivalent is *Cronos*, sometimes referred to as the "god of time".

Ops**:** In mythology, the wife of *Saturn* and a fertility deity (*Rhea* in Greek mythology).

--In contemporary times *Ops* can also refer to "OPERATIONS, usually of a secret or semi-secret nature".

Introduction:

The ideas presented in this report are for educational purposes and have factual and scientific foundations. Many pieces of evidence are shown that support the supposition that a semi-secret plan has been underway to alter one of our solar system gas giants significantly, even to the point of possibly becoming stellar; We will show here how such a method has likely been devised.

Many details in this book can be found in an earlier edition entitled *Jovian Transformation* by the same author. The present theory has changed some to reflect additional information gathered and more evidence uncovered in the last few years. The main changes from the original theory are that only 70% penetration depth for the *Galileo* fuel pellets is now assumed for *Jupiter* and around 80% penetration depth for the same regarding *Cassini's* pellets. Originally 90% was proposed for *Jupiter*.

We are concluding that after enough time has passed it appears *Jupiter* has avoided a stellar-inducing attempt and that we now turn our sights on what is possibly the main event, the ***Saturn* attempt**. Another significant change is that we now believe that sustained fusion is not possible inside *Jupiter*; the only possibility is for a temporary fission-fusion reaction to produce an initial effect and then create a temporary gravity-induced fusion from a cascading collapse effect inside *Saturn*. The latter "temporary fusion" could mean many years in cosmic terms though. We also introduce the possibility that a total cascading collapse does not produce a fusion reaction at all but simply alters the planet's rotation, orbit, tilt, and size.

We have always been on the outside looking in, trying to uncover what the insiders are attempting here. As such, we feel like we are reverse-engineering things and piecing together bits that can be gleaned. This study has been going on since 2003 and with each edition we feel the evidence has become more solid for the argument that "Yes, some major transformation of a gas giant has been planned here…" This book, *Saturn – Ops*, will be essentially the **6th edition** (and likely the last) of the continuation of the earlier *Jovian Transformation* books.

We will first go over the latest theory in brief and then later explain in detail how it was carried out. Much of the information regarding the carrying out of this project will be borrowed from the previous "test" attempt on *Jupiter*.

Turning a Gas Giant Inside Out (hypothesis in brief)

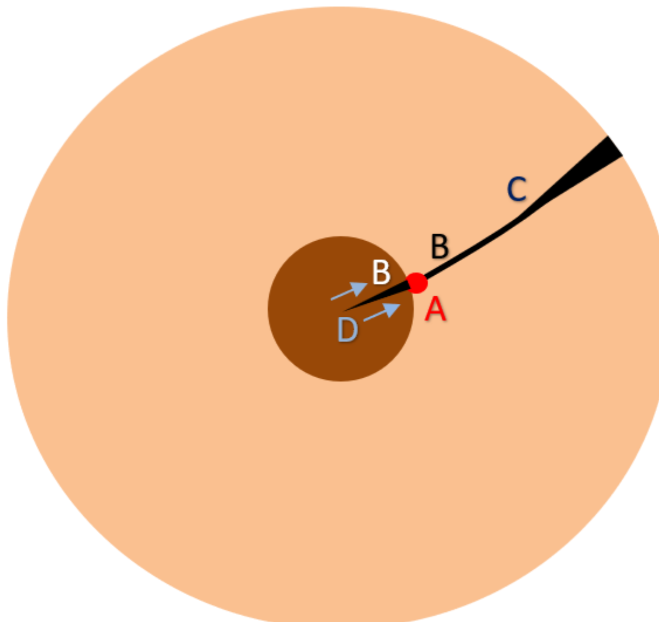
Prompt upward movement of rapidly liquefied, gasified, and extremely pressurized inner solid mass from planetary center Core to Surface (This will be called ***Core to Surface*** *theory,* **CTS** for short) -- A hypothetical method by which a planetary gas giant with a significant solid inner solid core under great pressure may be made to implode on itself thereby causing it to temporarily go stellar (or to at least change it significantly) from accelerating mass-gravity induced fusion. The general sequence for CTS is shown below.

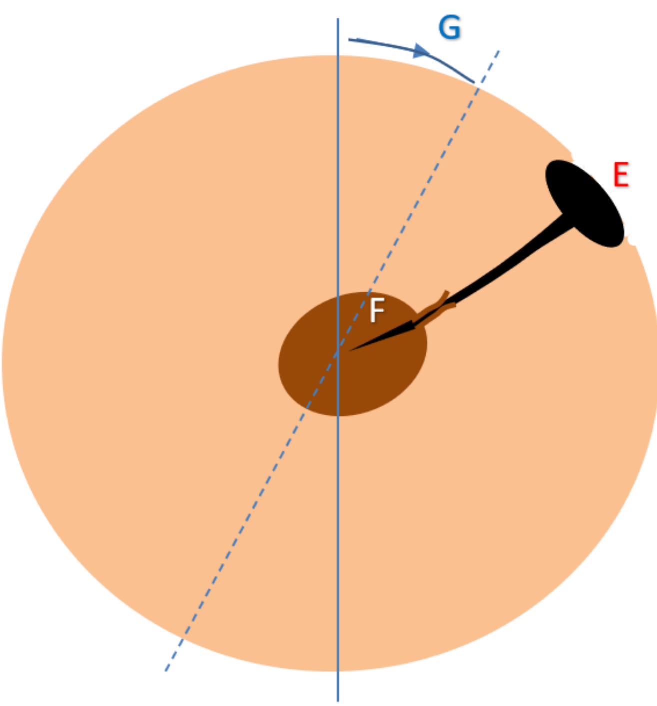
A: Fission to fusion implosion of fuel pellet causes a chain reaction of pressure release due to a temporary pressure void (extreme low pressure) after the initial reaction.

B: Both ends of this pressure void are affected by "pressure void filling actions".

C: Upward massive movement of high to low pressure – matter in motion.

D: Center evacuates up same route, as it sees a path of release of its massive energy; the entire solid center might be expelled upward lasting months to accomplish.

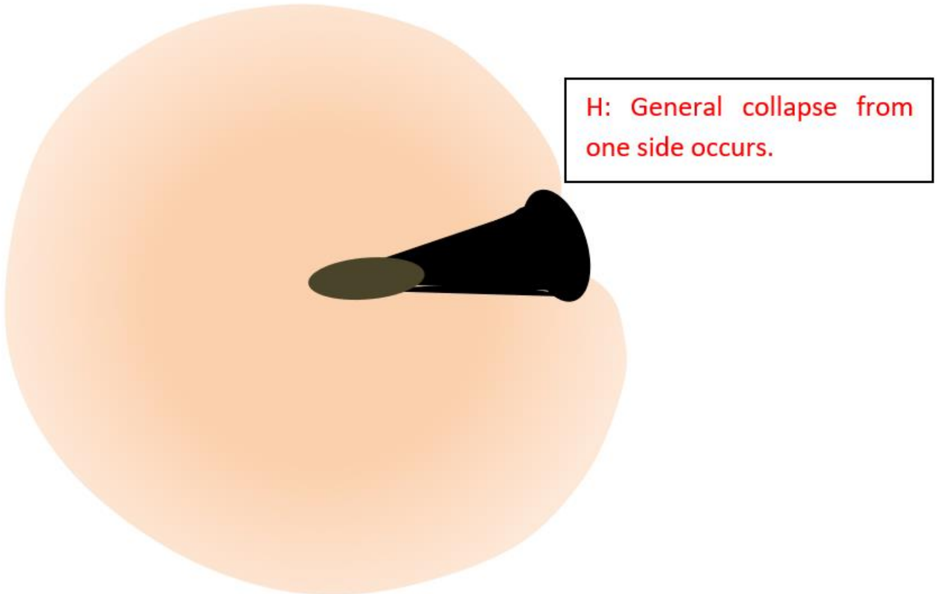


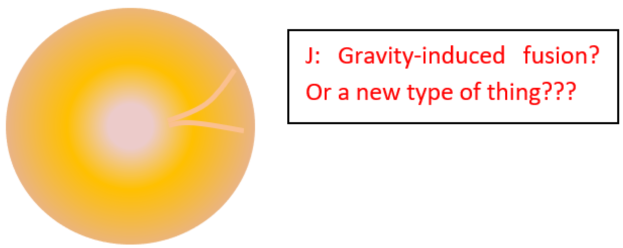


E: Very relatively heavy, dense material deposits on the surface of Saturn causing a distortion of the sphere itself.

F: Center continues evacuation and shrinks.

G: Saturn could experience a rotational shift and/or axis shift once enough central material gets displaced to the top. Think of a gyroscope whose center begins to move to the side in one location only. A wobble and adjustment would seem prudent.





Above: The general sequence of a CTS (A through J)

A gas giant's mass rapidly collapsing on itself into its center would cause such a density and heat increase as to induce a central ongoing nuclear fusion reaction; this is what conventional theory of stars tells us. Initially upon "ignition", a large amount of mass is thrown outward in the violent transformation, and a good deal of this mass escapes the gravity system of the planet to be thrown into its solar system in general.

The author suggests we have seen the above CTS method once in a fiction story, and one *test attempt* in real life, and that we have a chance of seeing a second significant genuine attempt unfold within the next few years. These three CTS's are summarized below.

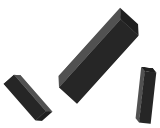
1st CTS - In the fiction novel and movie "*2010", Jupiter* would bear a black spot from the action of the "millions of monoliths" converging; the black mark area began to pull down on itself towards the center of the planet causing a cascading action that further pulled the surrounding volume of matter down until a chain reaction of falling mass was produced to cause a planetary implosion and subsequent gravity-mass induced fusion and the fictional star dubbed "Lucifer". This was the first time we saw CTS shown to us. In this instance the entire method was not explained to us but only hinted at. In this fictional account, "higher intelligence" or "aliens" had devised the method.

2nd CTS - When we witnessed the large black mark forming on *Jupiter* in 2009, sometimes called the "Wesley Mark" (after the discoverer, Anthony Wesley) this was the culmination of the first man-made attempt of CTS and it was unsuccessful (seems to have been unsuccessful to this point), or possibly just a test or sampling of the expulsion method. The strangeness of the mark will be discussed later and also the reasons will be shown as to why the conventional explanation of the cause being an "asteroid impact" does not make sense.

3rd CTS (jump to this section here) - The third instance may be witnessed sometime within the next few years on planet *Saturn*, as a similar sequence of methods and events has been applied there as was applied on *Jupiter* to produce the strange mark. However, the dynamics are different even though these gas giants are similar. The main difference is the assertion that ***Saturn*'s solid planetary core is very large** and that *Jupiter*'s core is/was very small.

What follow are the details from each of these three CTS events above, the first fictional, the latter two real…

1st CTS – "2010: The Year We Make Contact" / "2010: Odyssey Two", Movie / Novel and the Monoliths



The monolith of the book/movie is an enigmatic solid black object of proportions 1 x 4 x 9, the first 3 squares (1, 2, 3). It takes on various sizes but the proportions remain the same. At one point the astronauts notice millions of monoliths forming a fractal-like pattern on the surface of *Jupiter* all concentrated at one general location and exclaim their surprise at the pitch carbon black mark that is forming and starting to distort *Jupiter*'s surface there. As the mark grows alarmingly in size the crew realizes that something extraordinary in going to happen: *Jupiter* is beginning to implode on itself at the mark location and the logical conclusion is that it will result in something violent.

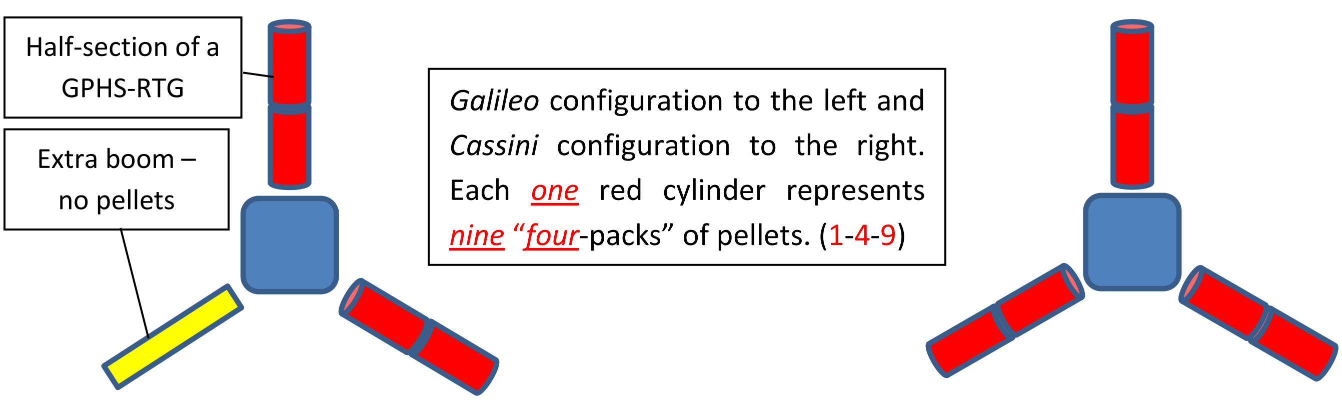
The crew discusses a few ideas and realizes that stellar ignition is possible in such a case; they just cannot imagine how the monoliths created so much mass AT THE SURFACE to cause this pulling effect. Of course, *Jupiter* does indeed ignite as the crew's spaceship speeds away just in time to avoid destruction from the nova shock wave via the newly formed star dubbed "Lucifer" (Light-Bringer).

https://www.youtube.com/watch?v=DYvvPZ6zwPE

The above link shows the beginning of the stellar sequence in the movie (released Dec. 7, 1984) as described.

This author suggests that the "monolith" in the movie represents the real-life plutonium-laden **GPHS-RTG's** of the *Jupiter* and *Saturn* mission satellites of NASA inside *Galileo* and *Cassini*; A double set of fuel pellets in the GPHS-RTG's (General Purpose Heat Source) are in **9** groups of **4** packs of pellets in **1** section, or 36 to a half-section. Four half-sections accompanied *Galileo* and 6 half-sections accompanied *Cassini* (144 and 216 fuel pellets respectively). This, of course, is the same ratio sequence as the monolith's actual dimensions in the movie *2010* and *2001* (**1-4-9**).

It is also interesting to note that that the storyline of "2010" involves dire conditions on Earth where the Western powers are at near-fatal disputes with the Eastern powers, especially USA and USSR, who are on the verge of a nuclear war. Does this condition sound familiar to you in 2022? Once Jupiter ignites into a star, the powers decide it is a supernatural sign and warning to come together in peace.



https://rps.nasa.gov/power-and-thermal-systems/thermal-systems/general-purpose-heat-source/

The fuel pellets hold the power to transform gas giants because they can fall deep into such a planet before actually being destroyed by pressure implosion. Several (or many) fuel pellets did survive atmospheric entry. More on this later.

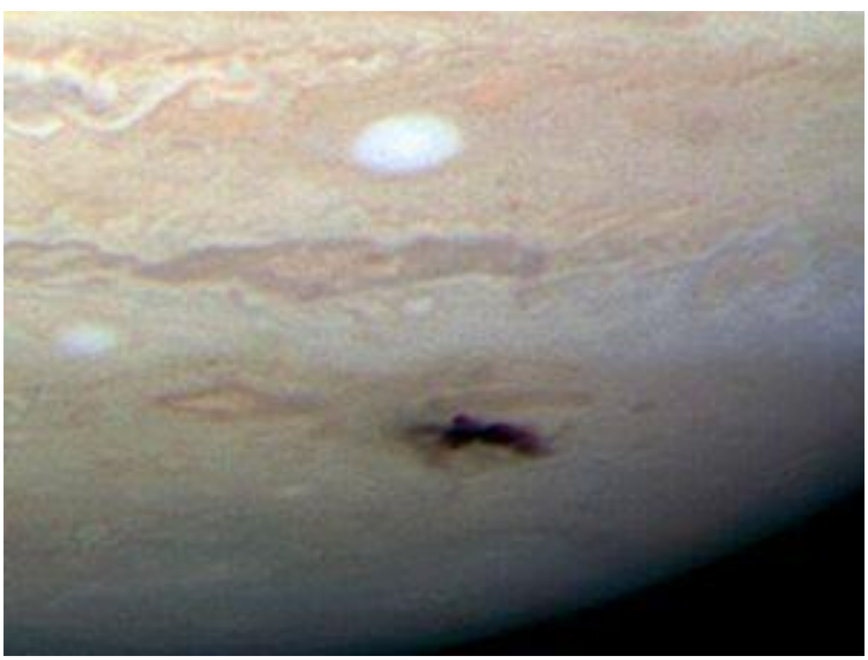
2nd CTS - *Jupiter*'s "Wesley Mark" from *Galileo's* GPHS-RTG's (the "test" of the method)

Note: extensive references below to the Galileo Mission will generally apply also to the Cassini mission (3rd CTS, pg. 62) when referring to the treatment of GPHS-RTG's and the fuel pellets aboard as both situations are very similar.

When *Galileo* plunged into *Jupiter* in September of 2003 it took almost 6 years (5 years 10 months) for one of the pellets from its RTG's to fall deep enough so that *Jupiter*'s pressure caused it to implode thereby initiating a fission explosion (Pu-238 and Pu-239) and a temporary fusion reaction. This event created a large but temporary pressure **void** as the initial event volume rocketed upward to lower pressure areas above. The new pressure void left behind sucked the more extreme pressure from below it and eventually from the center of the planet evacuating and releasing it upward; think of this as popping a viscous balloon using a very long pin where its central pressure is massive compared to its surface, and where the "balloon pop" is first registered at the pinpoint *once the pin gets most of the way in*. See the initial series of diagrams: *The general sequence of a CTS (A through J).*

Since *Jupiter*'s center was thought to only be a very small solid core, the event blew off in a few weeks without continuing to alter *Jupiter* significantly. When we saw the *Wesley mark* of July 2009, we were seeing *Jupiter*'s center being quickly expanded in volume, gasified/liquefied, and evacuated to its surface, hence the reason they could not explain the silica and carbon signature from the mark (they thought it was from an external source). *Jupiter*'s core is (was) thought to be silica. If *Jupiter*'s solid core had been large enough the evacuation of relatively heavy material to the top constantly for months might have collapsed *Jupiter* as we saw in the 2010 novel/movie event. Many details will now follow regarding this mark.

1-July 19, 2009 *Jupiter* Mark Event Details (7M09)



July 19, 2009 Mark Event (7M09) - Imaged on 7-23-09

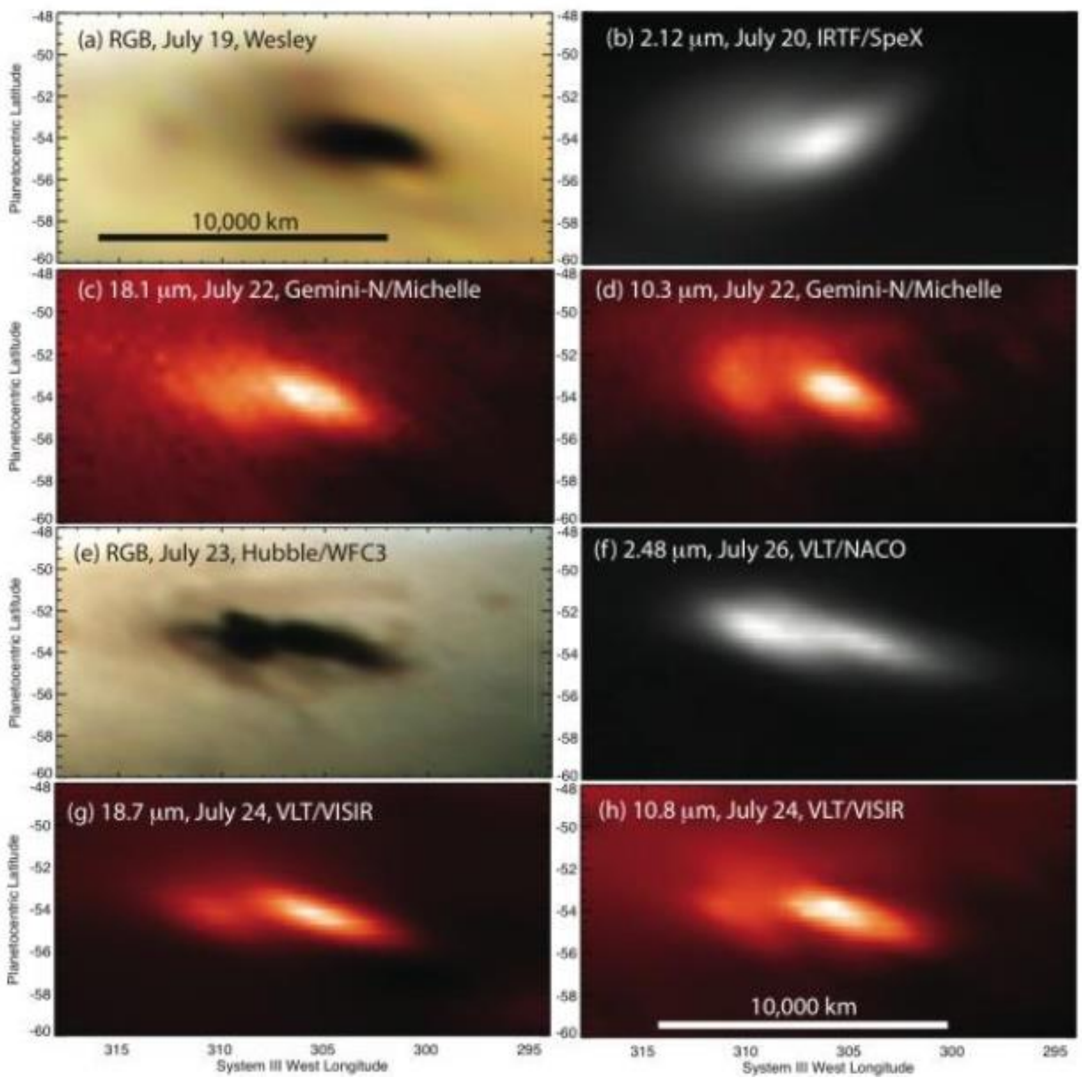
Image by NASA's Hubble Space Telescope 7-23-09: NASA, ESA, H. Hammel (Space Science Institute, Boulder, Colo.), and the Jupiter Impact Team [1]

On July 19, 2009 Anthony Wesley, an amateur astronomer from Australia, spotted a mark on *Jupiter* at -57, 216 SysII [305, SysIII] in the southern hemisphere. A few days later the Hubble telescope would get a close-up of it (above). The mark persisted and spread out for over 2 months maintaining its origin point and growing eastward from there; it was widely considered an impact event from an asteroid because no water and abundant silica were reported in the analysis of the signature. We have labelled this event as 7M09 (July Mark in 2009).

"Finding water at the site would indicate that the impactor was a comet." [Ultimately, no water was found] [24]

"Small kilometer-sized asteroids would also be hard to detect, however, and recent work by Orton et al. and Hammel et al. has strongly suggested the impactor was an asteroid, as it left only one impact site, did not reduce Jovian decametric radiation emission by contributing significant dust to the Jovian magnetosphere, and produced high altitude dusty debris full of silica, very different than what was produced by SL9." [25]

"By piecing together signatures of the gases and dark debris produced by the impact shockwaves, an international team of scientists was able to deduce that the object was more likely a rocky asteroid than an icy comet." [26]



Original Caption Released with Image [above]:

These images show eight different looks at the aftermath of a body -- probably an asteroid -- hitting Jupiter on July 19, 2009. Amateur astronomer Anthony Wesley was the first to capture an image of the impact, with a visible-light camera attached to his telescope in Australia. A NASA Hubble Space Telescope image was obtained in visible light. Infrared images were obtained by NASA's Infrared Telescope Facility and the Gemini North Telescope, both atop Mauna Kea, Hawaii, and the European Southern Observatory's Very Large Telescope in Chile. The images were taken between July 19 and 26, 2009.

Image Credit:
NASA/JPL-Caltech/IRTF/STScI/ESO/Gemini Observatory/AURA/A. Wesley

Image Addition Date:
2011-01-26

Figure 6 – 7M09 Image Series 1 [27]

From the below quotes it is clear that although the general astronomy community would very much like to call this event a comet-induced event, they are compelled to call it an asteroid because the signature evidence points to that. They are stuck by the facts of heavy debris, much silica, and no-water. However, this asteroid theory kills earlier theories that asteroids should have been gone long ago from this area.

> *"The new conclusion [asteroid] is also consistent with evidence from results from NASA's Hubble Space Telescope indicating the impact debris in 2009 was heavier or denser than debris from comet Shoemaker-Levy 9…"*

> *"Before this collision, scientists had thought that the only objects that hit Jupiter were icy comets whose unstable orbits took them close enough to Jupiter to be sucked in by the giant planet's gravitational attraction. Those comets are known as Jupiter-family comets. Scientists thought Jupiter had already cleared most other objects, such as asteroids, from its sphere of influence."* [26][28]

A "halo" is normally produced from the compression shock waves of an impacting object in such a case as this. Note the absence of a *halo* (in the images above and 1st image below) in the visible light spectrum as should have occurred in the event of this forceful impact. There appears to be a slight halo-type shape in image **(d)** in **Figure 6** but this shows up as heat in the *ejecta field* and is not a bow shock (halo); this effect can be accounted for in other ways and some of the debris in this area *was already there beforehand* as will be addressed now.

It's important to note that some of the supposed debris attributed to the "impact" down and right of the mark existed at least a day *before* the mark was spotted. Anthony Wesley verified on his astronomy website that there were pre-existing storms at the alleged impact location at least a rotation or two before:

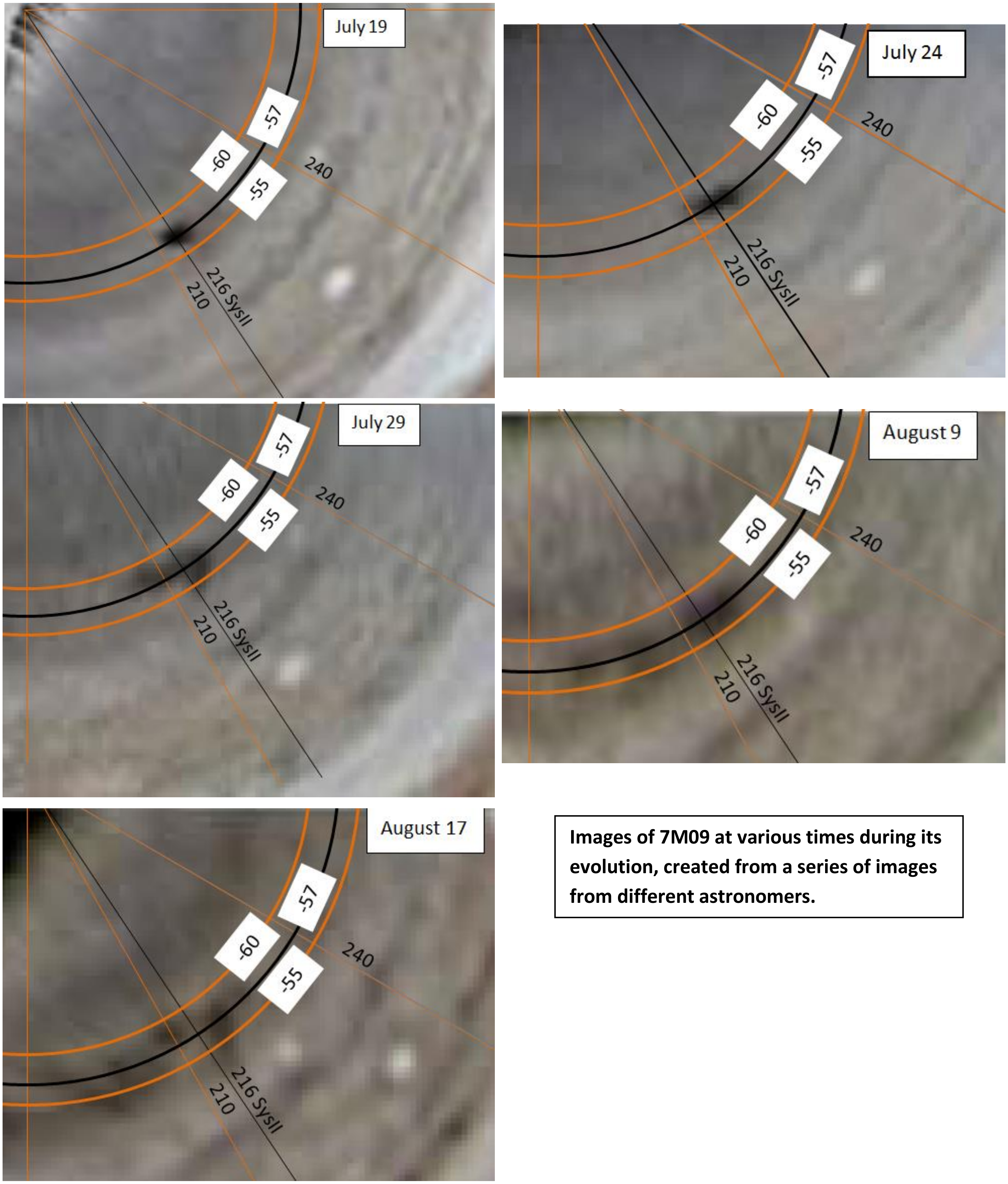
> *"Update: Two of these three small spots may be pre-existing small storms. Thanks to a blink comparison by Brett Hughes."* [29]

In the first image below we see a very faint "ejecta field" to the right and down of the mark (NW) in the image, which will be explained in a different way later (as mentioned above two of the "dots" we see are pre-existing). A classic halo and/or compression bow(s), occurring and lingering after the impact of SL-9 (G) in 1994 are shown on the second image below for comparison.

1- "Impact" mark on *Jupiter*, 19th July 2009 (7M09)
Credit: Anthony Wesley, Australia [29-30]

2- Hubble Space Telescope Color Image of 'Fragment G' Impact (SL-9)
Credit: Hubble Space Telescope *Jupiter* Imaging Team [31]

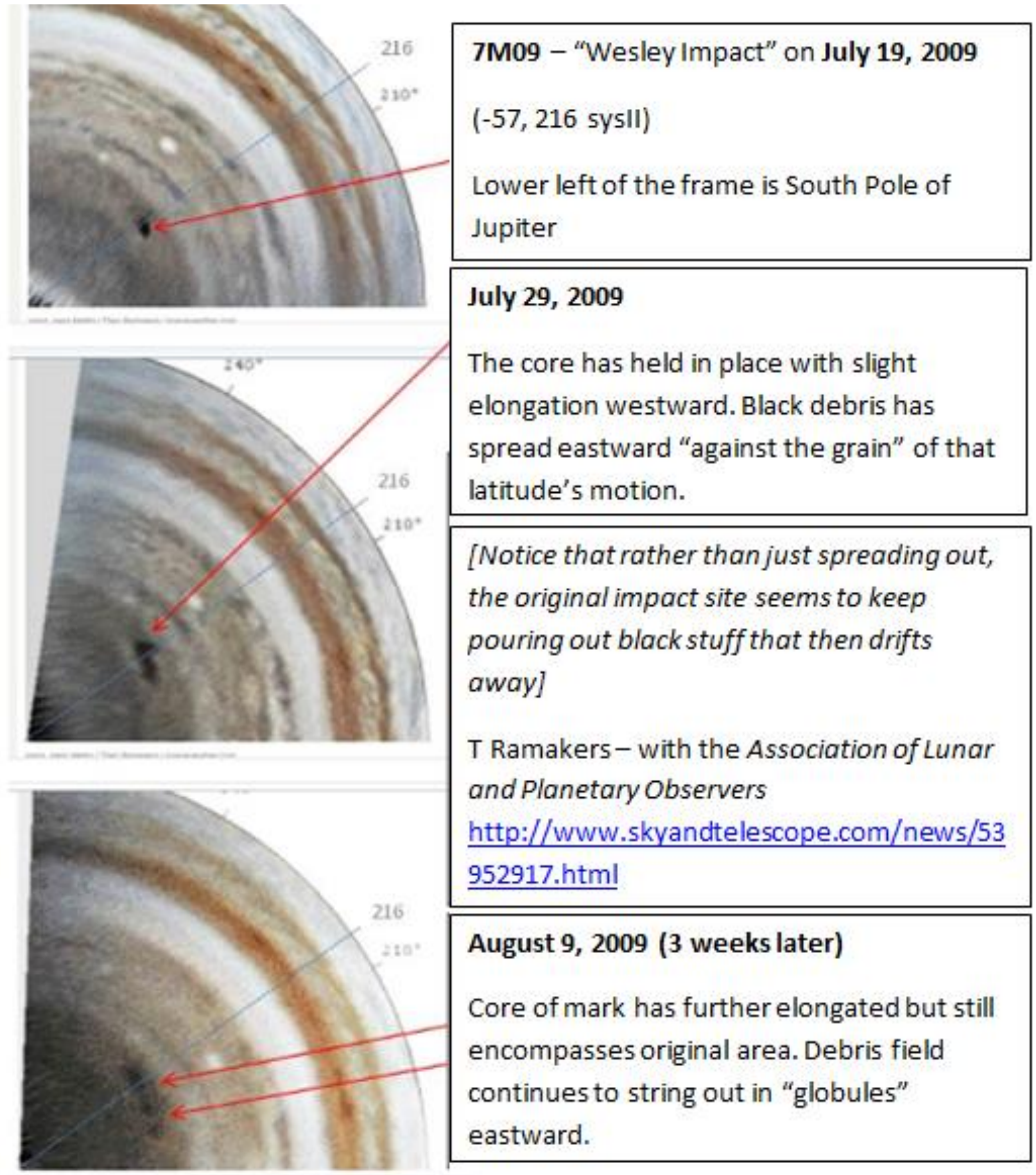
Figure 7 (above) – Wesley Mark Image (1st Image) Comparison with SL-9 Fragment G (2nd Image) [29-31]



Images of 7M09 at various times during its evolution, created from a series of images from different astronomers.

Figure 8 – 7M09 Image Series 2 [32-33]
[See 32-33 for Image Credits]

An online astronomy magazine with the help of astronomer Theo Ramakers noted the core location of the "Wesley mark" held a steady lat/long with little variance (images above and below); this should not happen with an impact event. Animation of this event, when multiple images were spliced together, confirmed that the core of the mark seemed to be held intact *from below* in the same general location and to create new globules or nodes from below while adding massive debris to the east from there as if being fed by a continuous stream from much deeper into *Jupiter*.



Individual frames, as included in an animation by Hans Joerg Mettig and Theo Ramakers (included with permission). The full animation can also be found at: http://www.planetary.org/blogs/emily-lakdawalla/2009/2049.html [34]

Figure 9 – 7M09 Image Series 3 [32, 34]
[See 32, 34 for Image Credits]

The nucleus of a such a mark from an impacting object should quickly break up and change coordinate locations, being mostly superficial, and the mark's core should not be discernible weeks after the event as **7M09** (Wesley mark) was. Note what Theo Ramakers said of the mark:

> *"Notice the [sic] rather that [sic] just spreading out, the original impact site seems to keep pouring out black stuff that then drifts away."* [34]

What Ramakers may be getting at is that this event is not acting like an impact but mass sourcing from underneath and shooting up from below. If this is true, this explains the adding of nodal areas to the east since no break up and drift of matter would be necessary, just a mild redirection of the source. This source could be redirected by much deeper events not seen anywhere near the surface.

Note that astronomers had to reluctantly resort to calling the culprit a dark, cold asteroid of 200-500 meters in diameter, despite prevailing theory that only comets should be hitting *Jupiter*, and at that, rarely. If it can be shown the source of the mark is *below*, then the "comets only" theory can be reinstated.

Also notice in this academic report from John H. Rogers, Anthony Wesley, and Hans-Jörg Mettig, *"The 2009 impact on Jupiter"* (J. Br. Astron. Assoc. 119, 6, 2009) http://www.britastro.org/Jupiter/2009/JBAA_119-6_Impact-paper.pdf, the **core** of the *Wesley Mark* drifted approximately 6-7 degrees retrograde per month, in the *opposite direction* with comparison the all extraneous event elements (even though the accompanying rate here is 12° retrograde per month),

"…suggesting that the impact core may be in a more sluggish current below the cloud-tops.", [33]

whilst spewing "smoke" to the east (prograde). This indicates a source from below that is forcing material up and out by its own willed path countering the motion of the *Jupiter* dynamics that were affecting the rest. For each area in question, it is not supported that debris from an impactor was being dispersed and flung around at the mercy of *Jupiter*'s elements. Most new action occurred strangely eastward (against logic), but the core largely remained stubbornly put, even more so in latitude than longitude.

At this low latitude (-57 southern) each degree is only ~54% of the distance compared to that at the equator. It is a relatively shorter distance to say "7° west" at this latitude. This still nets an elongation of about 4600 km which puts the enormity of this event in perspective. With that in mind realize that the motions of the alleged impactor debris defied logic on several accounts. Other quotes from the above-referenced paper:

> *"All the parts except the core had similar prograding drift…"* [the core was retrograde with only half of the motion of medium it was in] [33] (Brackets by JEC)

> *"Meanwhile the S edge of the site elongated rapidly eastwards (−22º/mth, July 20 to Aug 13, 58.5ºS). The mean speed at this latitude is close to zero* **[from -58.3 to -57 it goes retrograde from 1º to 12º respectively]**, *so the prograding drift may be special to the stratosphere…"* [33] (Brackets by JEC)

The mark (especially the core) also had very little **latitude** drift unlike the SL-9 fragment debris:

> *"The present impact however has not dispersed in latitude as much as some SL9 sites. Cloud streams from the large SL9 impacts, although initially at lower latitude, reached 66ºS…"* [33]

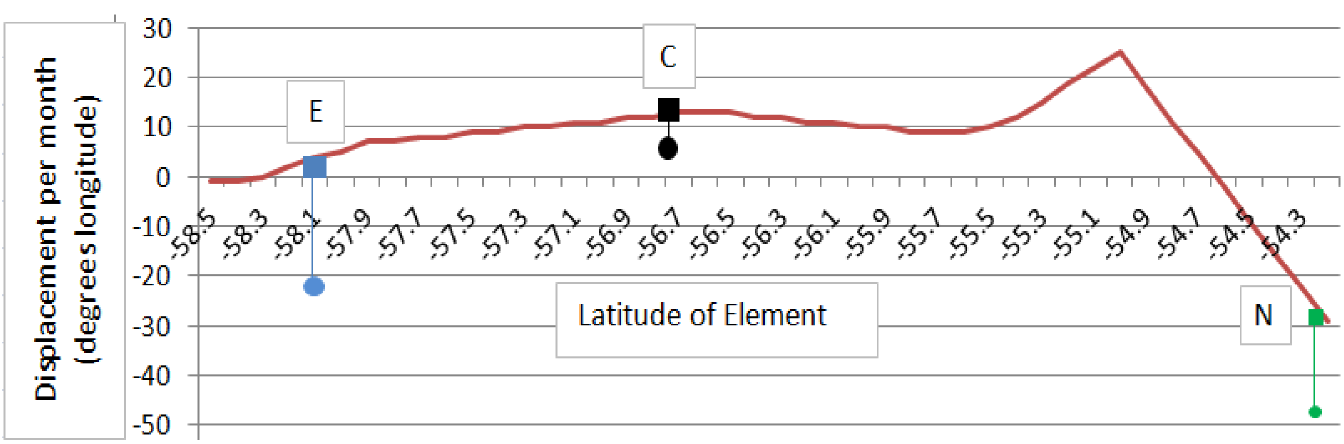


Figure 10 – 7M09 Mark Component Drift Chart [33]

Burgundy line = standard motions of **cloud displacement** per month at that latitude, measured by *Cassini* spacecraft.

Squares = **expected** displacement per month for the various elements E, C, and N.

Circles = **actual** displacement per month for the various elements E, C, and N.

Negative longitudes are *eastward* displacement; Positive longitudes are *westward* displacement.

C = Core of mark 7M09 (also known as the "Wesley mark")

E = Eastward nodal elements of the mark

N = Northern off-shoot of the mark -- July 29 to August 10

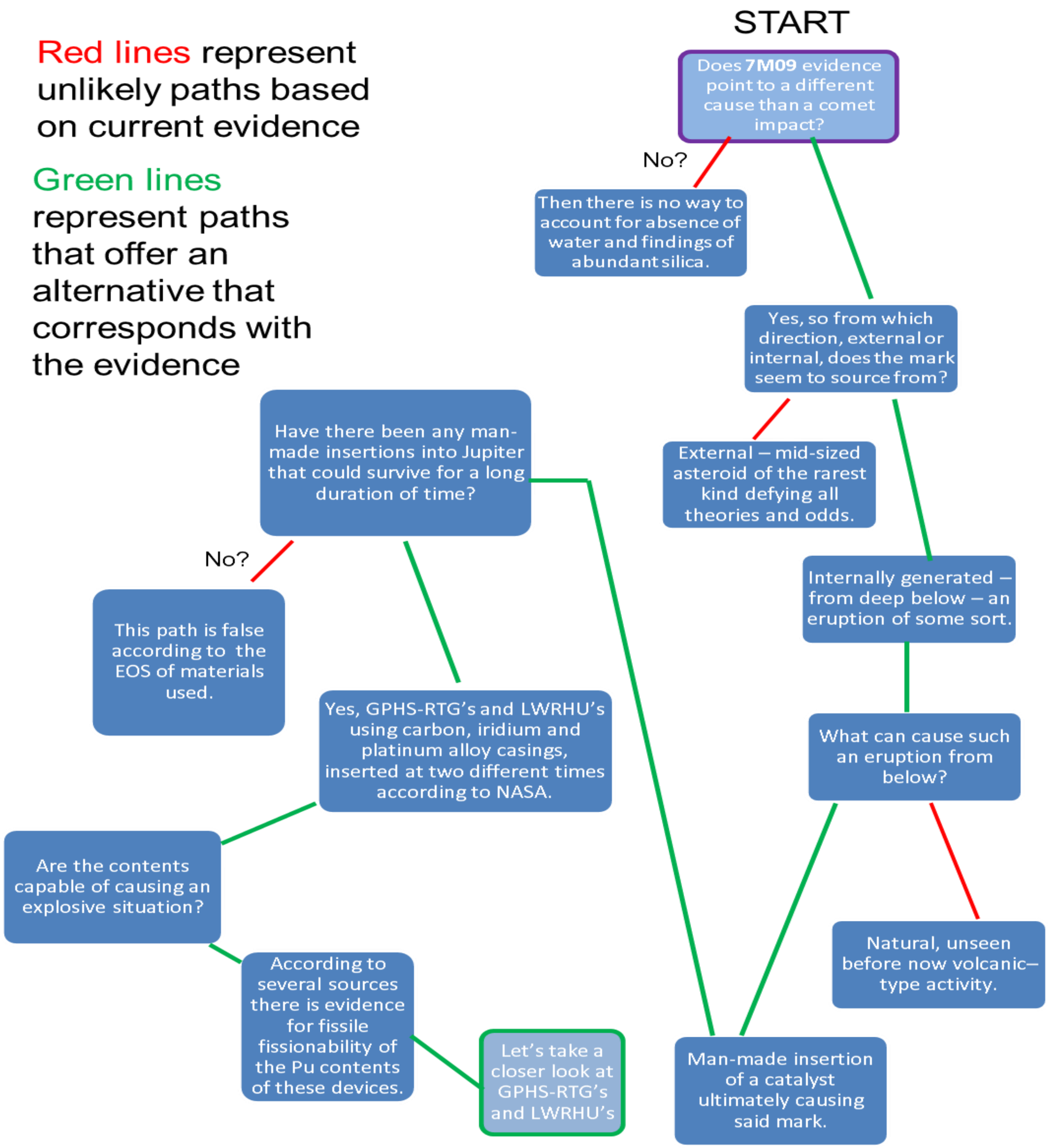
From studying **Figure 10** above one can see that *expected* displacements varied quite a bit from *actual* displacements indicating that major *additional forces other than visible atmospheric phenomena* were acting to affect and/or produce the mark elements, overriding the surface motions of *Jupiter*.

Other forces seem to have had major dragging effect to drive or hold the elements more easterly.

Please analyze the images in *Figure 8 & 9* then watch Theo Ramaker's animation at:

http://spaceweather.com/swpod2009/09aug09/polar_334.gif?PHPSESSID=1of9a9epkcu4ccdckqi9c0ocv5
Animation of Wesley's Jupiter mark, Spaceweather.com, accessed 3/24/2013 [35]

A very different cause for ***Jupiter*'s 2009 7M09 mark** will be discussed to explain the high-powered upshot of material from *below*. By examining the *flow chart* below the reader will be introduced to a new path of thinking that fits the evidence of what we have witnessed on *Jupiter*. Take some time to study it now.



There are two devices to study for the theory being proposed here since there are two types of fuel pellets admittedly inserted into *Jupiter*. Each would have survived to a certain degree after Jovian (and subsequent *Cassini-Saturn*ian) entry and each would have different drifting and dropping dynamics. Each of them has different amounts of Pu-238 oxide, different densities and different weights. The **Cladded GPHS-RTG Fuel Pellets** and the **Cladded LWRHU Fuel Pellets** are the two devices we will discuss that cause two variations of the hypothesis.

We provide here the information to show the possibilities associated with both devices.

Abbreviation notes:

GPHS-RTG is **General Purpose Heat Source – Radioisotopic Thermoelectric Generator** and will be further abbreviated to: "**G-R". G-R fuel pellet** is 151 grams of **plutonium-238 dioxide** inside an **iridium-based clad** and carbon casing within the G-R.

LWRHU and **RHU** are sometimes referring to the same unit. This is a small *Light Weight Radioisotopic Heater Unit* containing 2.66 grams of **plutonium-238 dioxide** inside a **platinum-30% rhodium clad** and carbon casing.

GSC refers to NASA's "*Galileo* Spacecraft" inserted into *Jupiter* on 9-21-2003.

GAEP refers to "*Galileo* Atmospheric Entry Probe" inserted into *Jupiter* on 12-7-1995.

SysIII refers to "System III" longitude positioning for *Jupiter*. This system is considered the official rotation rate system. It is sometimes called "**L3**".

Below, for reference, are standard melting point and density partial tables. Highlighted in red are many of the elements we will be discussing.

Partial List of the Elements - Highest Known Melting Points				
Kelvin	**Celsius**	**Element**	**Symbol**	**A#**
2023	1750	Thorium	**Th**	90
2045	1772	Platinum	**Pt**	78
2125	1852	Zirconium	**Zr**	40
2130	1857	Chromium	**Cr**	24
2150	*1877*	*Platinum-30%Rhodium*	***Pt-30Rh***	*n/a, alloy*
2163	1890	Vanadium	**V**	23
2239	1966	Rhodium	**Rh**	45
2423	2150	Hafnium	**Hf**	72
2473	2200	Technetium	**Tc**	43
2523	2250	Ruthenium	**Ru**	44
2573	2300	Boron	**B**	5
2663	*2390*	*Plutonium (IV) dioxide*	***$^{*}O_2Pu$***	*n/a, molecule*
2683	2410	Iridium	**Ir**	77
2741	2468	Niobium	**Nb**	41
2890	2617	Molybdenum	**Mo**	42
3269	2996	Tantalum	**Ta**	73
3318	3045	Osmium	**Os**	76
3453	3180	Rhenium	**Re**	75
3683	3410	Tungsten	**W**	74
3773	3500	Carbon	**C**	6

Partial List of the Elements Highest Known Densities (g/cm^3)	
Rhenium	21.02
Platinum	21.46
Darmstadtium	>21.46
Osmium	22.61
Iridium	**22.65**
Pu-oxide: 9.27 -11.5	

Figure 12 – Partial Element Tables: Melting Point and Density

****Note: The wording "oxide", "oxyde", and "dioxide" are used interchangeably for this molecule. Also the wording "Plutonium oxide" (or "dioxide"), "Plutonium IV oxide" (or "dioxide") are almost always referring to the same reactor-grade (not weapon's grade) plutonium with the large amount being Pu-238 combined with a mix of other isotopes of plutonium along with oxygen. "Pu-238 dioxide" is probably the best name to use.***

2-*Galileo* Spacecraft GPHS-RTG's Jovian Entry – September 21, 2003 (Possible cause of 7M09, Wesley mark)

Figure 13 – Galileo Spacecraft Rendering with 2 GPHS-RTG's (in grey) on Booms [46]
https://solarsystem.nasa.gov/rps/*Galileo*.cfm, *Galileo* (spacecraft rendition), NASA – Radioisotope Power Systems, accessed 6/7/2016

The actual orbiting *Galileo Spacecraft* **(GSC)**, not to be confused with the probe called GAEP, made a plunge into the equatorial latitude of *Jupiter* to end its mission on September 21, 2003.

The estimated entry point was approx. 0, 157 +/-5 (L3).

The GSC contained 144 G-R fuel pellets (GPHS-RTG fuel pellets) each with a fissile plutonium-238 dioxide mass of 1/3 pound or 151 grams (**G-R's are a larger version of LWRHU)**, 72 of these being in each of 2 RTG's (**Figure 13-14**). Each G-R fuel pellet was shielded by its main RTG casing in the *General Purpose Heat Source Module* as well as individually with many layers of protection, allowing survival of entry of at least some of the fuel pellets into *Jupiter*'s atmosphere (see **Figures 14-23** for unit breakdown).

The GSC also contained 103 LWRHU's which would have taken a *different drift path* inside *Jupiter* than the RTG components having a different size and density.

Both GPHS-RTG and LWRHU fuel pellets were advertised as necessary for keeping the craft's instruments powered and heated. The GPHS-RTG fuel pellets in the RTG are similar in design and protection to the LWRHU's set-up, only the former having much more plutonium oxide and occurring together in groups of 72 within an RTG.

Our contention is that not all of GSC burned up upon Jovian entry (and not all would have burned up of CSC- *Cassini Spacecraft* either during the *Cassini* plunge). The higher melting point items protected with aeroshields (heat shields) survived entry and fell deep into *Jupiter*. Note the information below on survivability of spacecraft upon accidental atmospheric re-entry.

> *"Although many people believe that satellites burn up completely during atmospheric reentry, some satellite components can and do survive the reentry heating (of course, satellites designed to reenter, like the space shuttle or Soyuz, survive reentry entirely because they are protected by specially designed heat shields). Component survival on an unprotected satellite can occur if the component's melting temperature is sufficiently high or if its shape enables it to lose heat fast enough to keep the temperature below the melting point."…*
>
> ***"How much material from a satellite will survive reentry?***
>
> *Generally, about 10-40 percent of a satellite's mass will survive reentry. The actual percentage for a specific object depends on the materials used in the object's construction and on shape, size, and weight of the reentering object. For example, if the object consists of empty fuel tanks made of stainless steel or titanium, both of which have high melting temperatures, much of this material will survive. If much of the structure is made of aluminum, which has a low melting temperature, a smaller percentage will survive."* [47]

As stated above, for uncontrolled Earth re-entry about 10-40% of a craft's mass will survive, usually the parts with higher melting points and better shapes for surviving aerodynamically (the average is 25%).

An uncontrolled Earth re-entry reaches velocities of around 29,000 kph or 8 kps. The *Galileo* craft was noted as going into *Jupiter* with a maximum 48.2 kps for comparison (6x faster).

If we take a typical Earth reentry survival rate of 25% and do a simple linear reduction for increased velocity, this would reduce the amount of debris survival by 6x; this gives us an average survival rate of 4.2%. The items that survive will be the high-melting point items like iridium, platinum, and carbon and spherical shapes with less surface area exposure (rounder objects like GPHS-RTG Fuel pellets).

Below is a diagram of NASA's GPHS-RTG, two of which entered *Jupiter* on September 21, 2003.

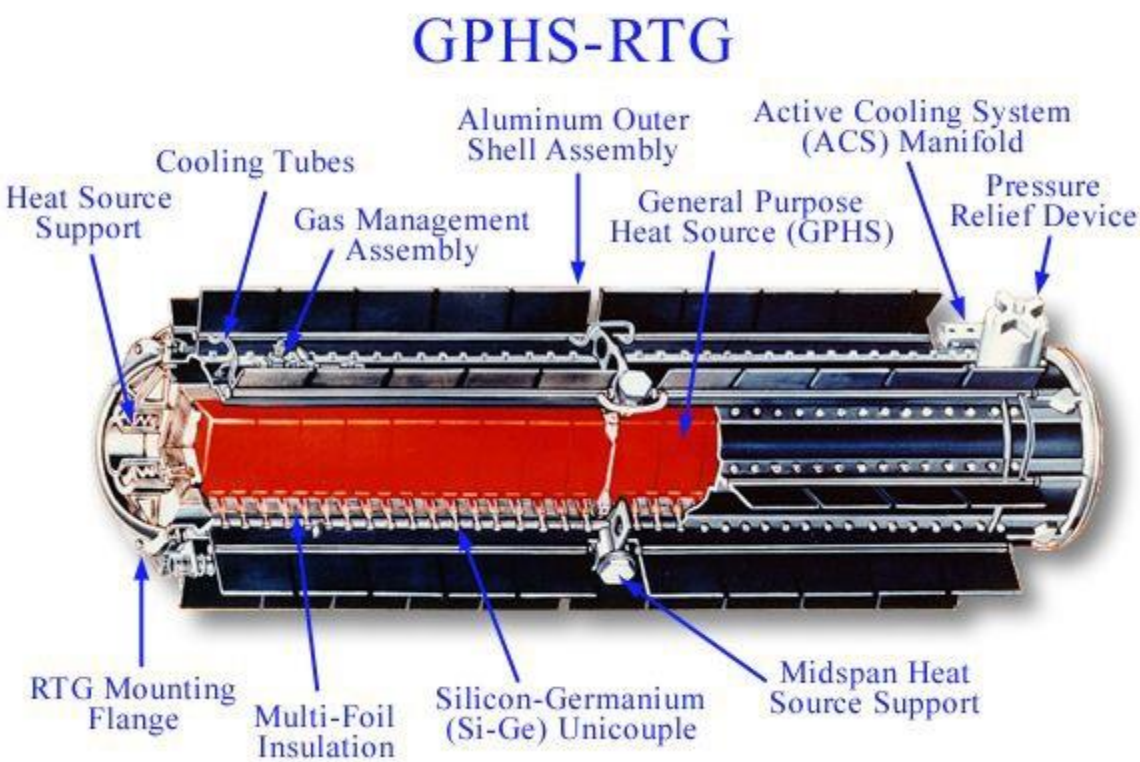


Figure 14 – GPHS-RTG Diagram [48]

3-*Galileo* Spacecraft's GPHS-RTG's Details

General Purpose Heat Source - Radioisotopic Thermoelectric Generators

Here is some information from Los Alamos Laboratory concerning the plutonium fuel pellets aboard the RTG.

> *"In the GPHS, PuO2 is contained within a cladding of iridium-based DOP-26 alloy. This alloy contains 0.3-0.5 wt.% tungsten and trace amounts of aluminum and thorium. In service, a protective graphite impact shell (GIS) of fineweave-pierced fabric (FWPF) graphite (AVCO Systems Division) surrounds the GPHS cladding."* [49]

The iridium cladding and PuO_2 inside, referred to above, are what is generally called "G-R fuel pellets" in this book.

144 of these fuel pellets were intentionally plunged into *Jupiter* on September 21, 2003 with the *Galileo Spacecraft* end of mission plan. It would be prudent to also analyze the capability of these devices to survive melting and drop deep into *Jupiter*, since out of 144 tries, it seems likely that a few may have survived the hot gas giant atmospheric entry, as these devices were made to excel in staying intact in such a case as accidental Earth re-entry, albeit a less intense re-entry.

Most everything we have mentioned regarding GPHS-RTG fuel pellets will also apply to LWRHU's except, as mentioned, they former are about 57 times more massive in the amount of Pu-238 oxide they contain. This fact alone makes them a much better candidate than the LWRHU components for our theory soon to be discussed in depth.

Also, the clad protection on each one is a bit different but still contains metals and elements of high melting point and stability. The cladding is iridium-based instead of platinum-based, as with the LWRHU's, but platinum and iridium are very similar metals with similar structures (iridium has higher density and may likely perform better than platinum).

Below are general diagrams and images of the GPHS-RTG modules used on the RTG's. 72 fuel pellets were in each of 2 RTG's aboard the *Galileo Spacecraft*.

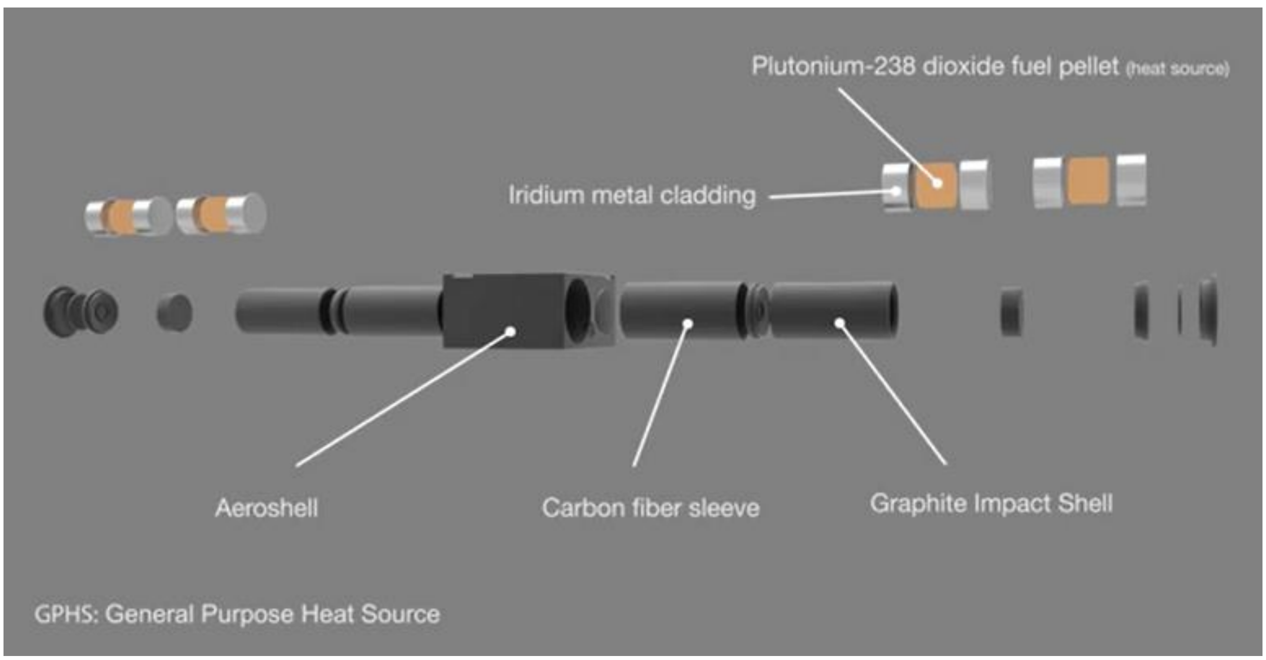


Figure 15 – The Parts of a Single GPHS-RTG Module

(18 full modules, stacked, make-up a complete GPHS unit on an RTG) [50]

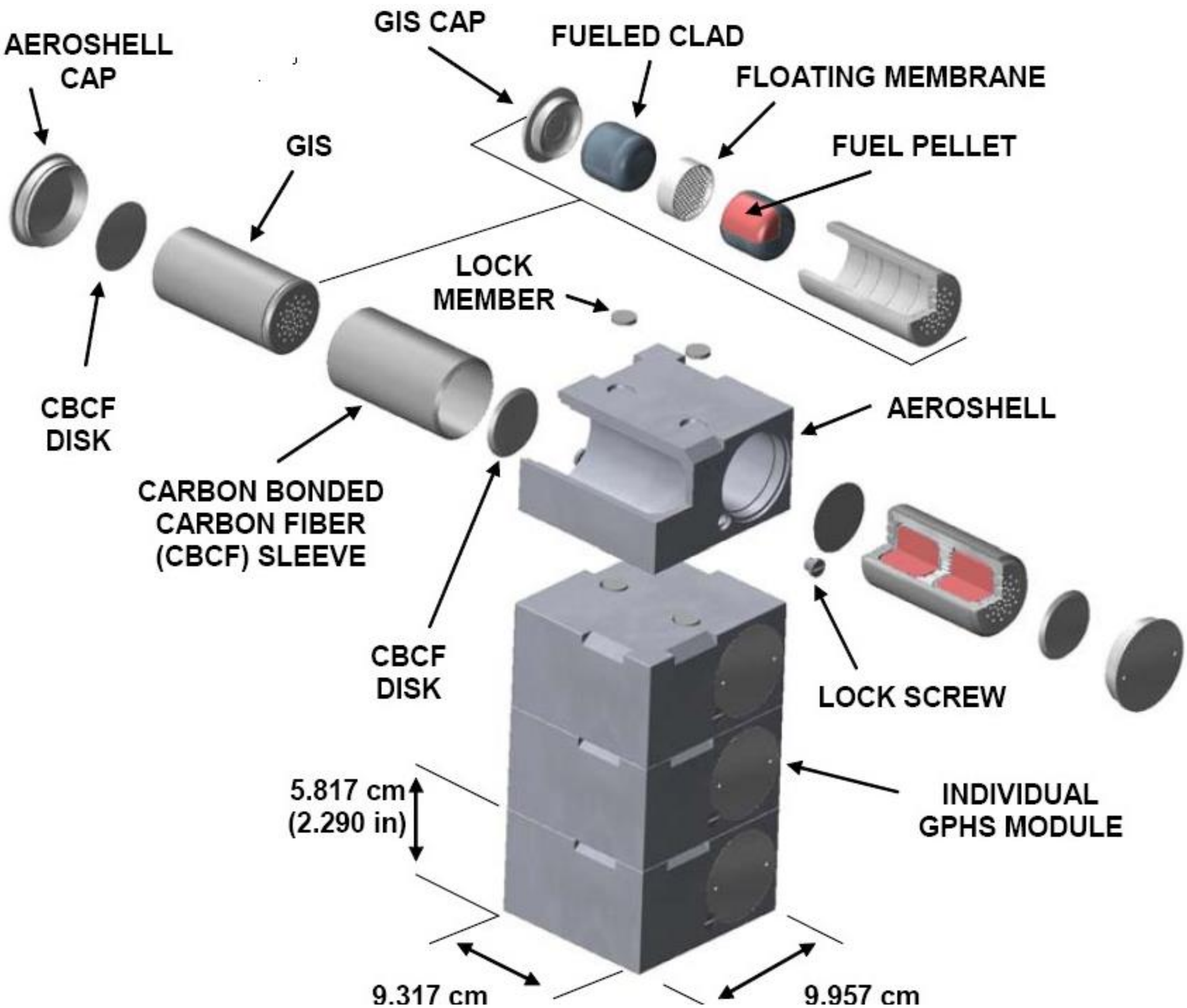


Figure 16 – GPHS-RTG Module Diagram A [51]

Above is a module detail showing the various elements of each module pulled out. Note the multiple carbon sleeves and iridium shell protection as well as the sturdy aeroshell itself.

Note in the text below how the pellet protection was designed to keep the clad/pellets intact in case of re-entry.

> *"GPHSs are designed with safety in mind and employ iridium-clad plutonium-238 pellets. The generated alpha particles are blocked by the cladding, thus no further radiation shielding is necessary. The pellets are encased within nested layers of carbon-based material and placed within an aeroshell housing to comprise the complete module.*
>
> *The modules can withstand extreme conditions including a launch-pad explosion or a high-speed reentry. Overheating and impact tests were performed on several sample modules."* [52]

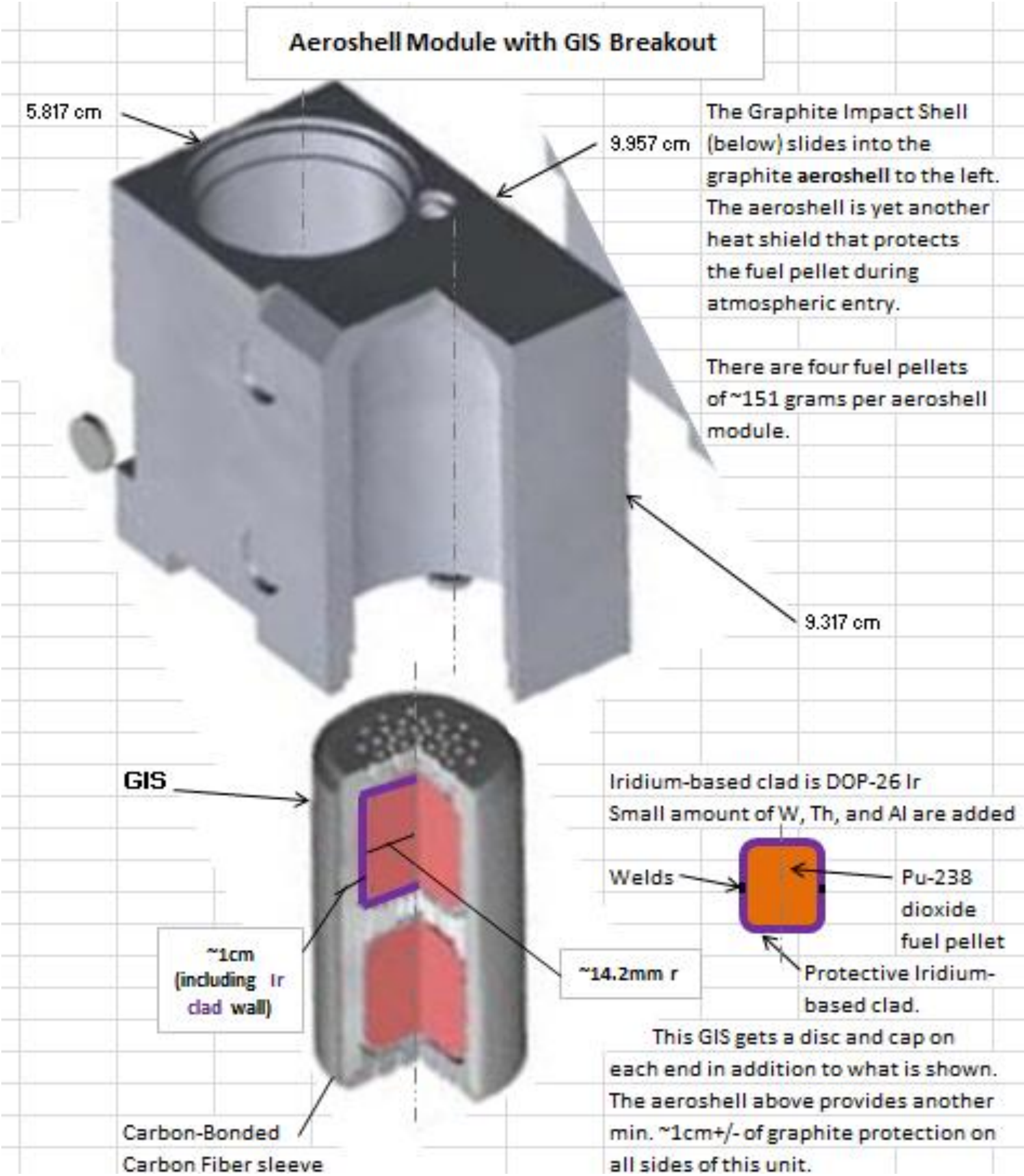
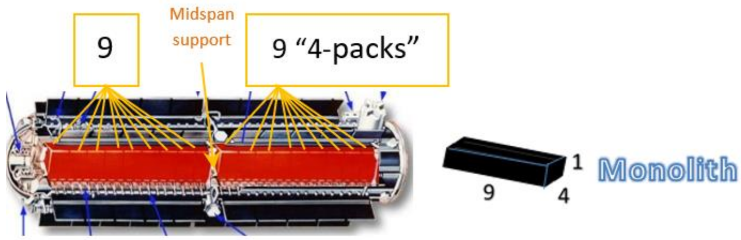


Figure 17 – Aeroshell Module with GIS Breakout [51, 53]

Above is shown a breakout diagram of the GPHS-RTG fuel pellet section outside its heat shield (aeroshell). Each red/orange cylinder area shown is the actual plutonium-238 dioxide fuel pellet. Some rough dimensions are shown to get an idea of the size. In this diagram you can see that a <u>four</u>-pack of fuel pellets will fit into each <u>one</u> module; there are <u>nine</u> modules per group (see below) in a GPHS-RTG before there is a center split, and another 9 modules occur on the other side (this reminds us of the 1-4-9 proportions of the *monolith* in the movie "2010").



Above: 1 Module has 4 plutonium fuel pellets of 9 groups doubled to make a GPHS-RTG. It can obviously be representative of the “monolith” from the movie/novel “2010” which had dimensions of 1-4-9.

Below we have illustrated the approximate minimum wall protection at the start of any re-entry that each pellet would have. Most of the time there is even more *aeroshell* width than this, but the general minimum is shown here.

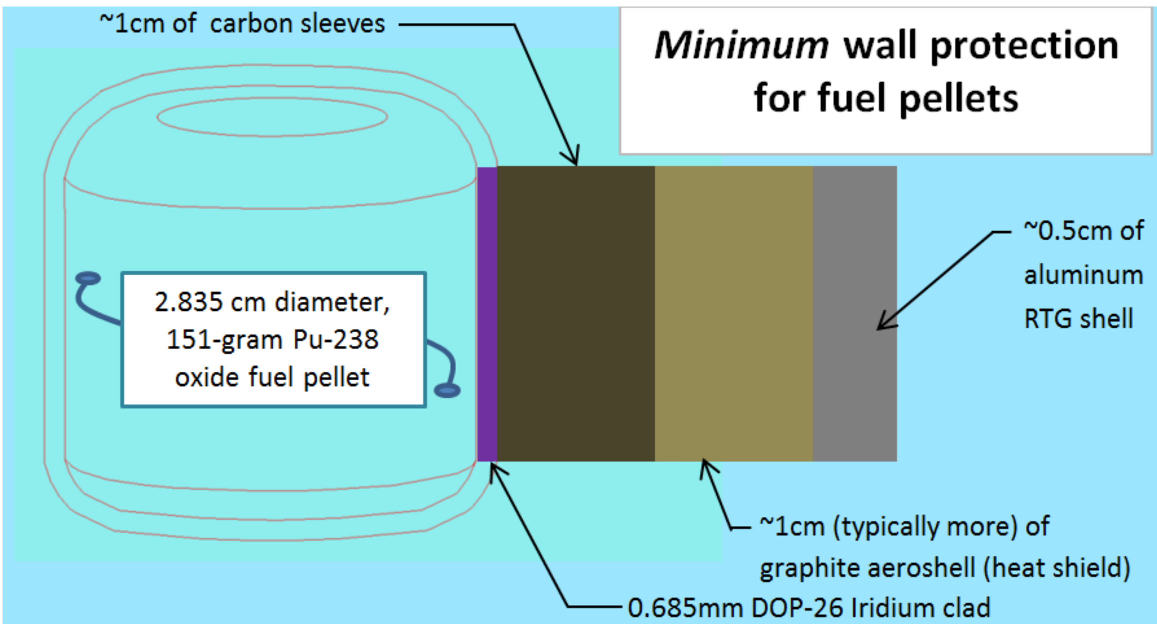


Figure 18 – Minimum Total Wall Protection for G-R Fuel Pellet [51]

(Most surrounding areas have more than 1cm of aeroshell)

Below is a different breakout showing the contents of a typical module, 18 of which occur on each RTG. Four fuel pellets are in each module.

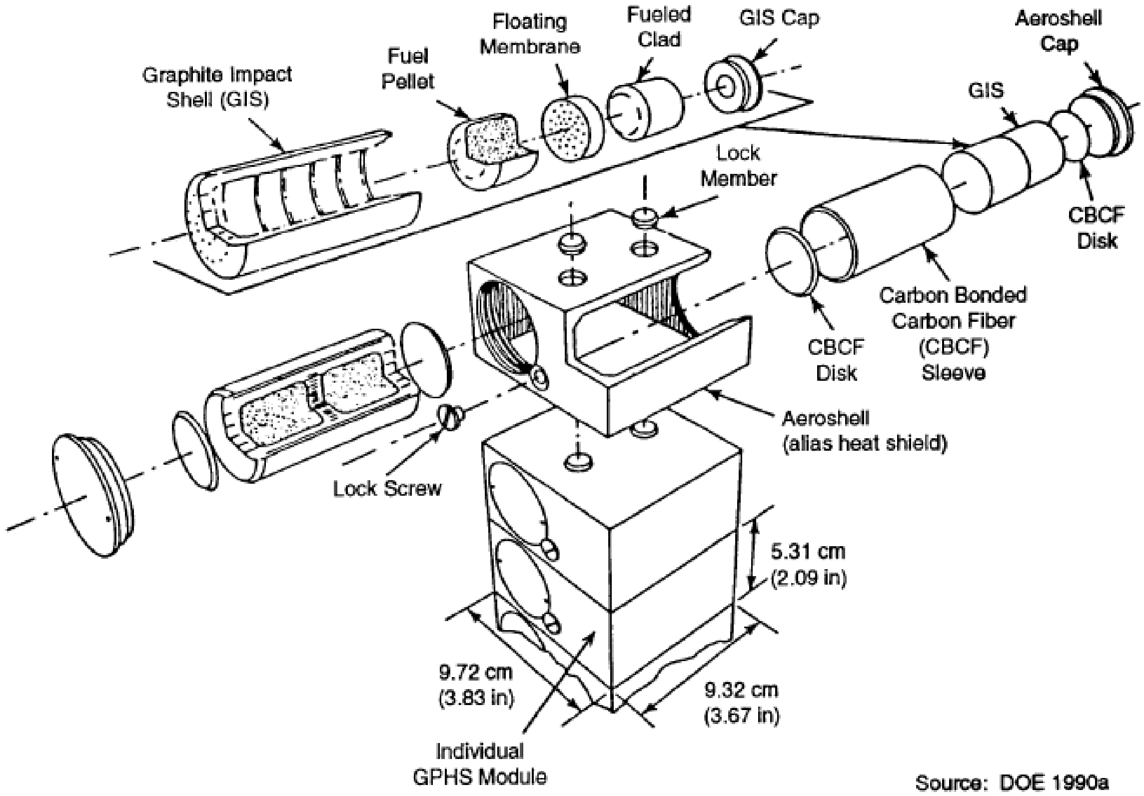


Figure 19 – GPHS-RTG Module Diagram B [53]

Below are two images of the fuel pellets on a typical GPHS-RTG. The first image is the fuel pellet wrapped inside its iridium shell; the second is the bare pellet outside its shell.

Figure 20 – Image of a Pu-238 fuel pellet in its protective iridium cladding.
Image Credit: Dept. of Energy [54]

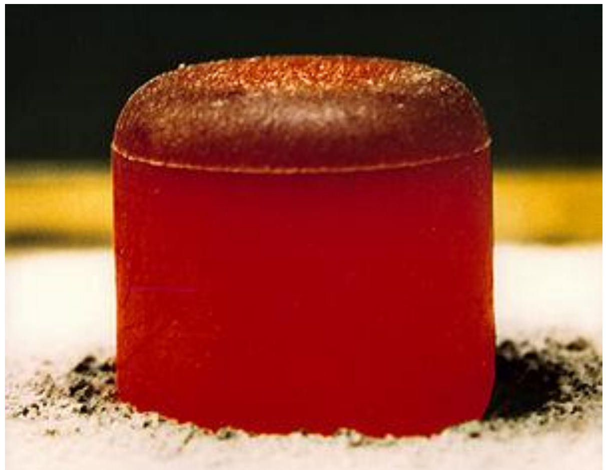


Figure 21 - A Pu-238 fuel pellet outside its protective iridium cladding. [54]

Here is the original caption for the image above:

> *"A pellet of $^{238}PuO_2$ as used in the RTG for the Cassini and Galileo missions. This photo was taken after insulating the pellet under a graphite blanket for several minutes and then removing the blanket. The pellet is glowing red hot because of the heat generated by radioactive decay (primarily α). The initial output is 62 watts."* [54]

Below is yet another way to look at the module. The size of the fuel pellet in comparison to the entire module can be well-visualized here.

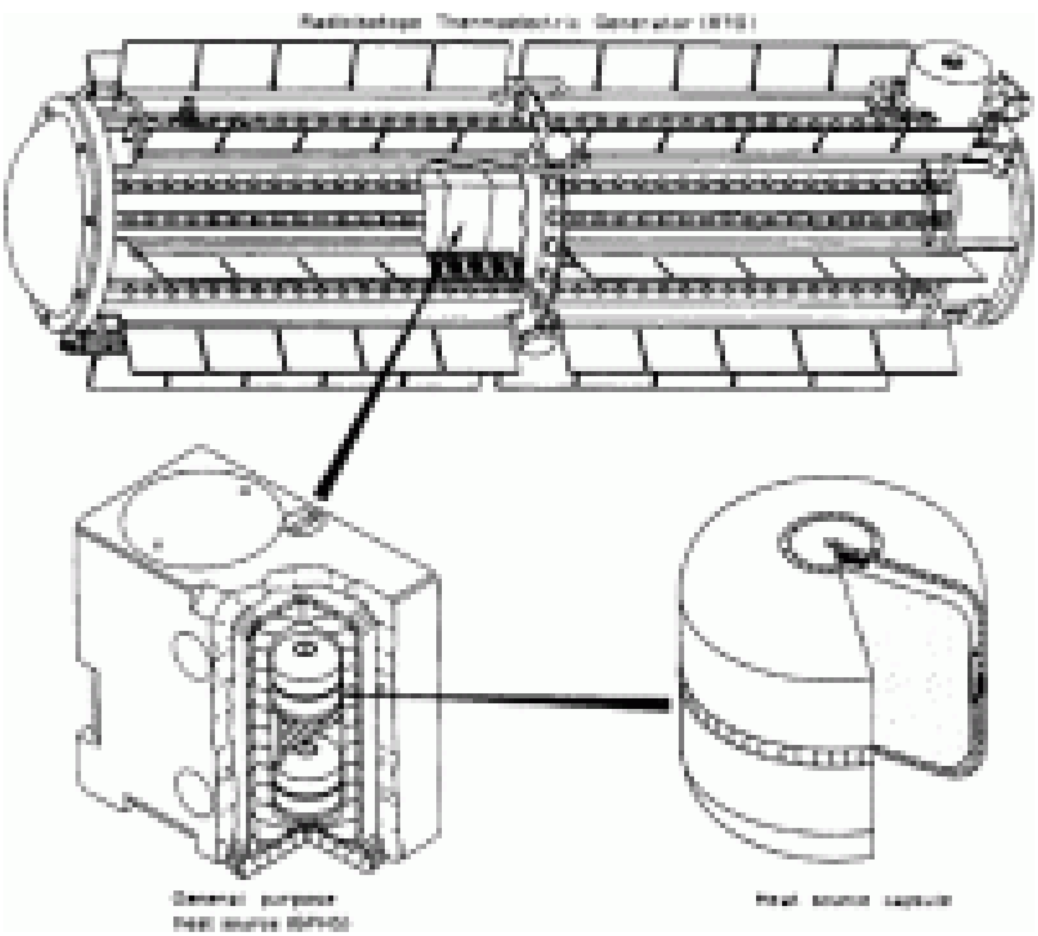
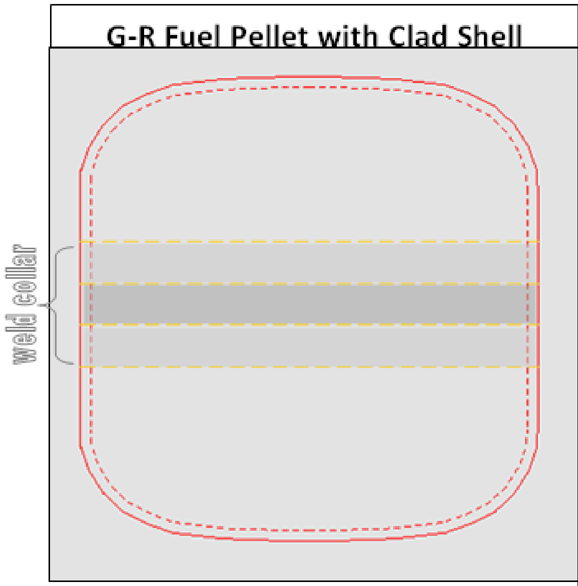


Figure 22 – Diagram of GPHS-RTG Assembly, Source: DOE 1990a
Four 151-gram G-R Fuel Pellets each module (each of 18 modules per RTG assembly) [55]

Below is an attempt to show accurate dimensions as well as masses and densities for the shell and fuel pellet in question. The "collar" in the diagram is the result of the welding of the two iridium-based halves to form a seam at the middle.



Specifications for the GPHS-RTG heavily rounded cylinder Fuel Pellet and Clad:

Shell:

2.997cm h

2.972cm Ø

0.685mm thick shell of DOP-26 Ir alloy

DOP-26 Ir contains by weight: 99.689% Ir, 0.3 per cent tungsten, 60 ppm thorium and 50 ppm aluminum. The later metals are "dopants" to increase resilience and ductility at high temperatures. Density = 22.64g/cm^3

Inside the Iridium shell:

Pu-238 dioxide pellet of 151 grams

2.86cm h

2.835cm Ø

Density = 9.27 – 11.5g/cm^3 (depending on text source)

16.29 or 13.13 cm^3 volume of pellet at **9.27** or 11.5 density

Starting density of entire clad + pellet (at 9.27g/cm^3) density: **~11g/cm^3**

Figure 23 – G-R Clad and Fuel Pellet Details [55]

Below is a deeper explanation of the various parts shown in **Figure 23**.

> *"Each heat source capsule, producing about 60 watts of heat, consists of a pressed and sintered pellet of plutonia weighing 151 g contained in a 0.685 mm thick shell of DOP-26 iridium alloy. The capsule, shown … is 29.97 mm long and 29.72 mm in diameter. Capsule closure is accomplished by an autogenous gas tungsten arc weld at the equator. Each capsule has a sintered iridium frit-vent at one pole to release the helium which is produced by α-decay within the fuel pellet. The frit-vent, covered by its 0.127 mm thick iridium decontamination cover…"* [55]

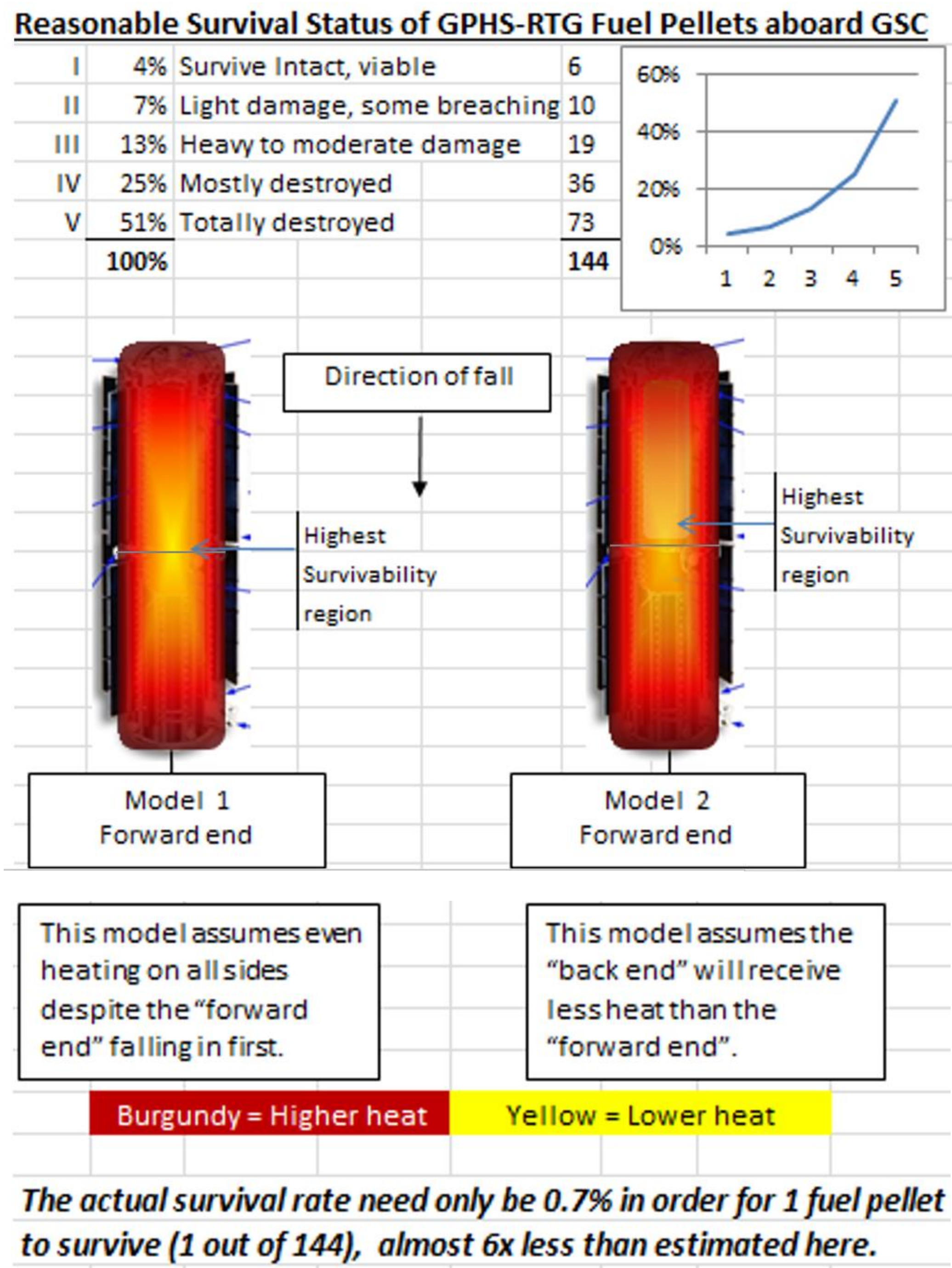
> *"The addition of tungsten was found to improve alloy fabrication and increase yield strength, while additions of thorium and aluminum greatly improved ductility at very high strain rates by increasing grain boundary cohesion….The optimised iridium alloy used for RTG fuel encapsulation, known as DOP-26, contains by weight 0.3 per cent tungsten, 60 ppm thorium and 50 ppm aluminum."* [55]

> *"Because of their unique properties, two platinum metals alloys, DOP-26 iridium and Pt-30%Rh, have been used to encapsulate $^{238}PuO_2$ fuel pellets for the Cassini Mission heat sources. Extensive physical, mechanical and impact property testing have*

shown that these alloys are capable of providing the requisite fuel containment during all credible accident/malfunction conditions." [55]

4-Reasonable Survival Rate of the GPHS-RTG Fuel Pellets during atmospheric entry (the author's estimation)

Knowing the sturdiness and safety components built into the GPHS-RTG system, it is safe to assume that at least a few of the fuel pellets aboard GSC survived the Jovian plunge (and *Saturn*ian plunge). Below are two estimate models of RTG destruction heating based on the "forward" end being the one plunging face downwards the entire time of entry. The "fins" are shown outside the heat area because we assume they will be destroyed first. The burgundy areas represent highest heat and the light yellow, lowest heat.



Reasonable Survival Status of GPHS-RTG Fuel Pellets aboard GSC

I	4%	Survive Intact, viable	6
II	7%	Light damage, some breaching	10
III	13%	Heavy to moderate damage	19
IV	25%	Mostly destroyed	36
V	51%	Totally destroyed	73
	100%		144

Figure 24 – Estimated GPHS-RTG Fuel Pellet Status after Jovian/Saturnian Atmospheric Entry

It is easy to see that the central or central/mid-rear region, the more "yellow" areas, will have the best chance of survival even to the point of no significant damage. This particular area is the 9th and 10th modules back from the forward end, especially the 10th module. This is the same area where the "mid-span" support slightly separates the two halves of the RTG (between 9 and 10).

If we use the level of "4% survival rate" as suggested in earlier in this section, which seems reasonable enough, this would mean that at least "6" G-R fuel pellets survived intact through the *Galileo* atmospheric plunge on 9-21-2003, most likely from the center sections of each RTG unit.

In reality, the survival rate only needs to be 0.69444% (less than 1%) or exactly 1 fuel pellet for us to have to consider the next step. It is reasonable to assume at least that rate out of caution since one can imagine scenarios that might have accidentally protected the RTG's even more. For instance, even though they enter *Jupiter* exposed on the booms, who is to say they may not have inadvertently gotten knocked into the hull of the craft upon the first jolt. This alone would add several more layers of protection.

As the situation is described, the aeroshell is listed as a "heat shield" for the fuel pellets in the module implying that this will take the brunt of the heat on any atmospheric entry. Other layers then take over from there. It is probably too conservative to say only 4% of the pellets survived entry as likely many more than this did, yet for our hypothesis here we will assume a half dozen survived intact.

We will soon discuss the implications of some of the G-R fuel pellets surviving *Jupiter* entry.

5-*Galileo* Atmospheric Entry Probe (GAEP) LWRHU's Insertion – December 7, 1995 (a less likely cause of 7M09)

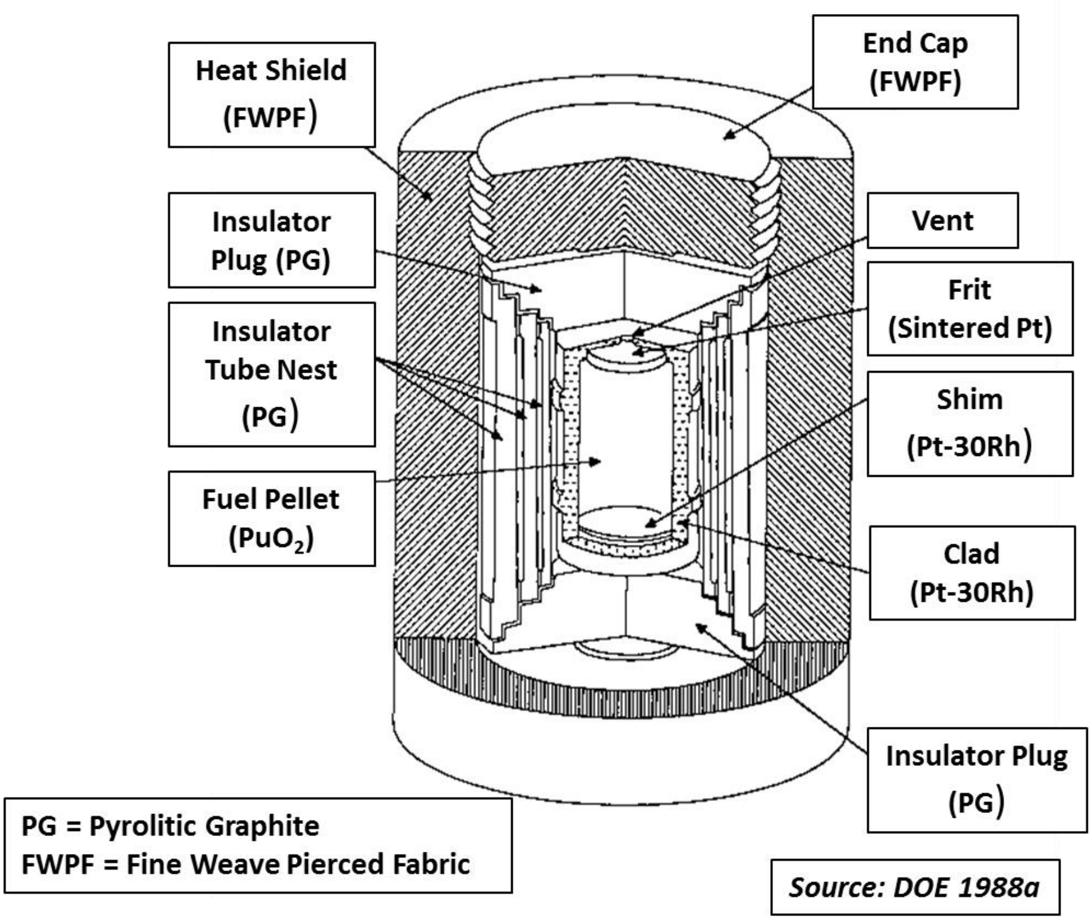


Figure 25- Lightweight Radioisotope Heater Unit (LWRHU - Primarily used as a heating device for probes)

The device shown above was admittedly inserted into *Jupiter* on two occasions: 17 LWRHU devices with GAEP (*Galileo* Atmospheric Entry Probe) delivery into *Jupiter*'s atmosphere on 12-7-1995 and 103 units aboard GSC on 9-21-2003. Nearly all of the outside material of LWRHU's, "PG" and "FWPF", is carbon-based and the important "Clad" material is an alloy of platinum with 30% rhodium used for its extreme durability and ductility. Often the whole unit, LWRHU, will be referred to here generally as "pellet", whereas "**fuel pellet**" will refer to the **plutonium pellet *inside* the clad**. This device contains 2.7 grams of plutonium-238 oxide.

The insertion we will focus on is the former one in 1995, discussed below. It will show that, by default, the LWRHU's survived atmospheric entry because they were on the back side of the very heat shield that protected the GAEP probe during the hot decent through *Jupiter*'s atmosphere.

In July of 1995, the GSC arrived at *Jupiter* on time to release its probe (GAEP) into a trajectory to dive into *Jupiter*'s atmosphere near the equator at *6.5 N, 4.4 W (L3)* on December 7th, in order to take scientific readings, *"6.5°N, 4.4°W at entry interface"* . [57]

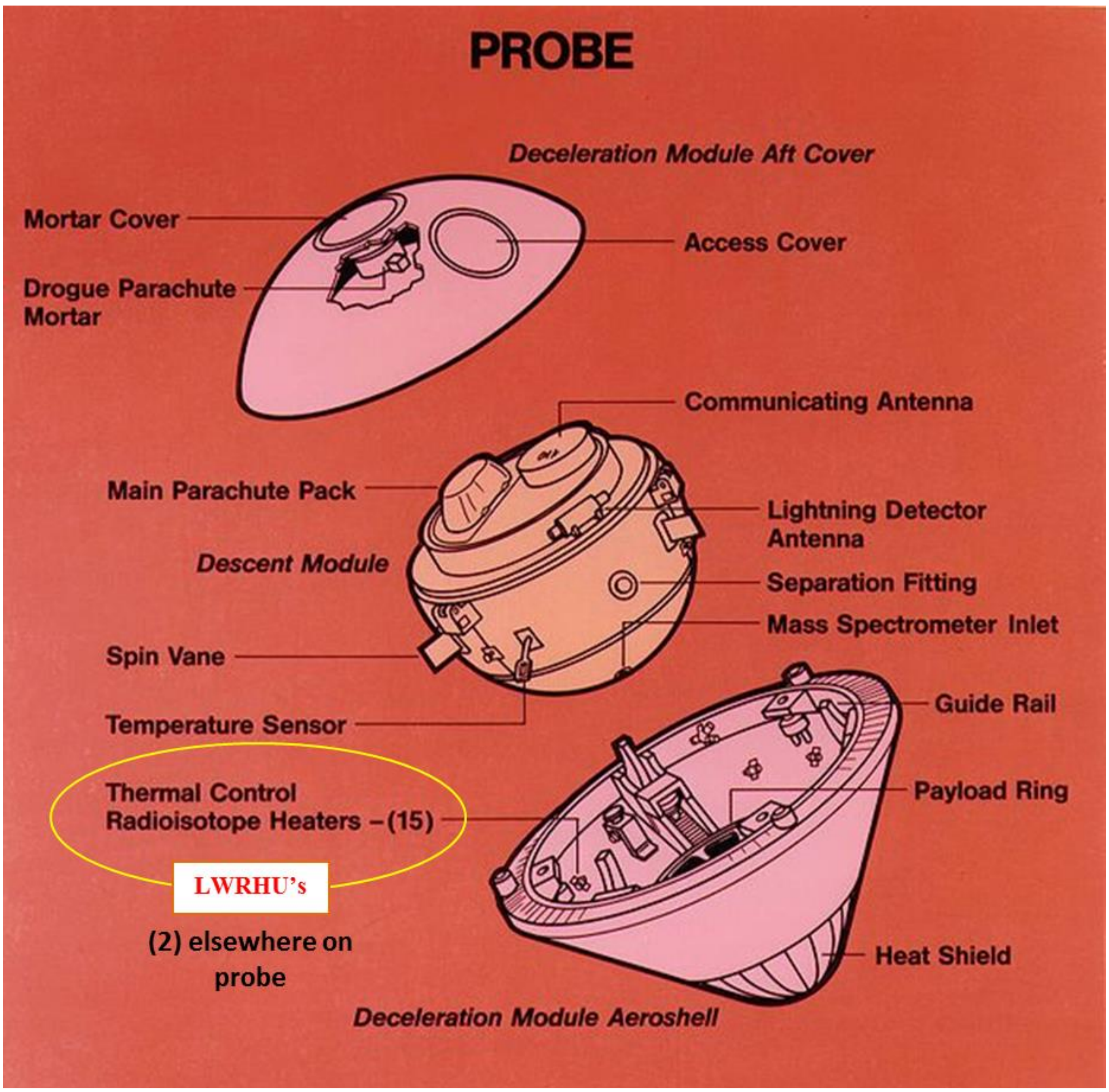


Figure 26– Galileo Atmospheric Entry Probe (GAEP) [58]

The probe carried 17 LWRHU's (**Figures 25-27**). These Light-Weight-Radioisotope Heater Units; each contained 2.66 grams (0.006 pounds) of Plutonium-238 dioxide in pellets the size of a standard pencil eraser head; all but two rested behind the front heat shield of the probe, the shield being used to protect the probe's equipment upon atmospheric entry. *Note: Although this diagram shows "15" LWHRU's, the textual documentation states "17", so likely there were two on the probe itself and 15 on the back of the heat shield.*

> *"Galileo - 120 RHUs (103 on orbiter, 17 on atmospheric probe)"* [59]

The cylindrical Pu-238 capsules were protected from atmospheric entry heat by the GAEP heat shield (**Figure 26-27**) in addition to each pellet individually having the sturdy multilayered shield (**Figure 25**). The advertised intent of an LWRHU is for minor heating of equipment (Since GAEP was released early from the spacecraft on a long trajectory to its plunge destination it would experience very cold temps.).

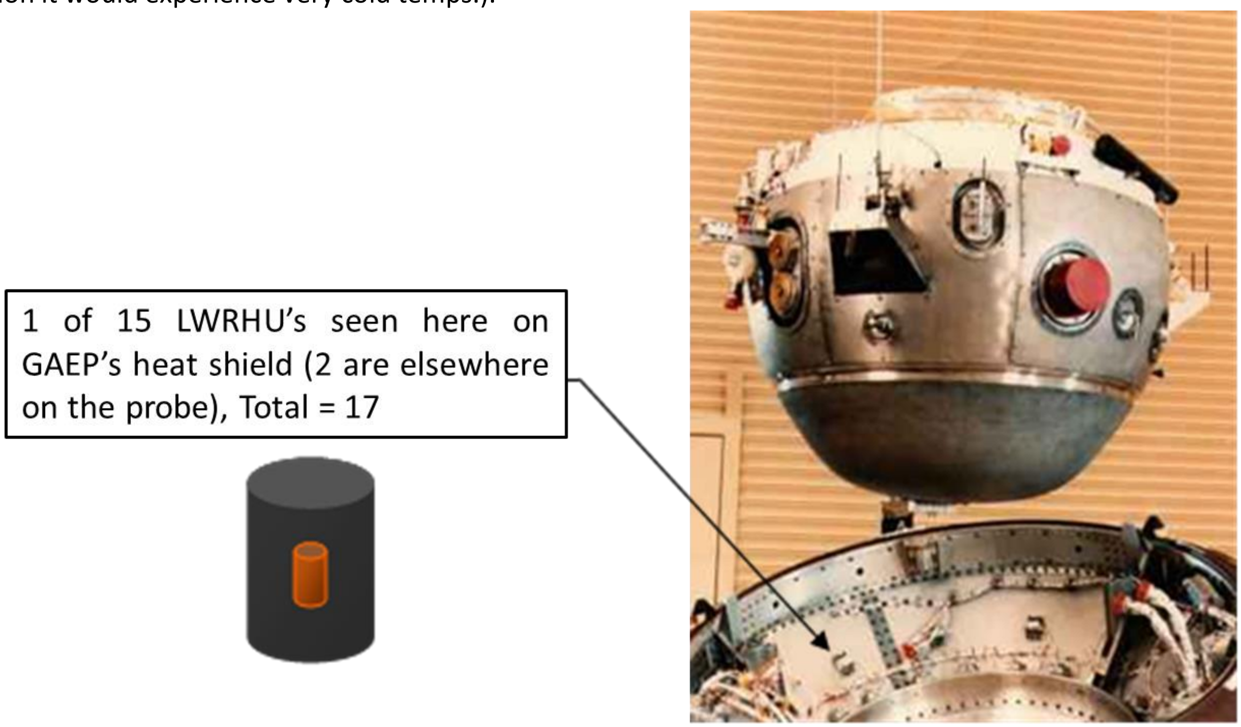


Figure 27 – GAEP – Galileo Atmospheric Entry Probe (With heat shield shown detached) (Image by NASA) [60]

There are 6 layers of protection tightly surrounding one of these plutonium fuel pellets (**Figure 25**):
--1/2" aero-heat shield;
--7/16" total of graphite-carbon insulators (**4 insulators** = 7/16" total); and
--**0.04" thick <u>platinum--30% rhodium</u> alloy (0.875mm thick)**;
--Inside sits the plutonium-dioxide (Pu-238/239 and other Pu isotopes plus a small amount of Oxygen) of 0.006 pounds. -
--The entire LWRHU is a cylinder shape of 1.3" long by 1" Ø (about the size of a large spool of thread), weighing 40 grams. [61]

As is further illustrated in **Figure 28** below, at least 17 plutonium pellets of 2.7 grams each, certainly survived atmospheric entry into *Jupiter* since 15 were attached to the back of the "Forward heat shield" of GAEP, and two on the probe itself, that later conducted measurements.

> *"The deceleration module consisted of the fore and aft heat shields and their accompanying support structure and the thermal control hardware for the phases of the mission through entry into the atmosphere. The ablative forebody heat shield was made from a carbon phenolic material. The afterbody heat shield was composed of a phenolic nylon material…"*

> *"During entry into the Jovian atmosphere, as the probe was subjected to temperatures near 14000 K, the forward shield was expected to lose around 60% of its 145 Kg mass. A drogue parachute was deployed, using a mortar, when the probe was at a velocity of about Mach 0.9 and a dynamic pressure of 6000 N/sq-m. Once the drogue chute was released, explosive bolts were*

fired to release the aft cover which in turn pulled out and stripped off the bag containing the main parachute. This entire process was designed to take less than 2 s." [62]

A "carbon phenolic" increases the carbon shield's ability to withstand heat by specially treating it.

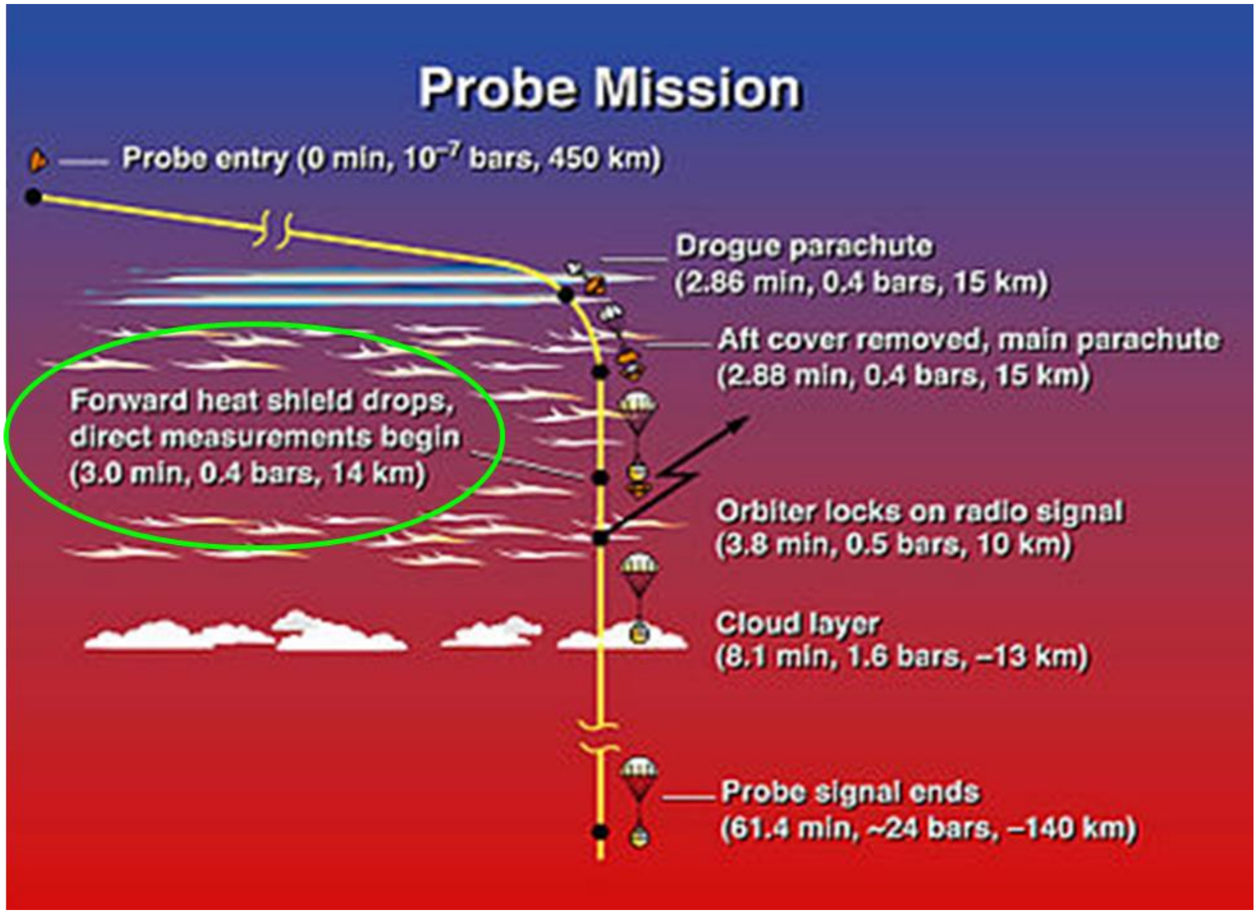


Figure 28 – GAEP Entry Details [63]

"As the probe descended through 150 kilometers of the top layers of the atmosphere, it collected 58 minutes of data on the local weather. It only stopped transmitting when ambient pressure exceeded 23 atmospheres and temperature reached 153 °C (307 °F) [426 K]… The data was sent to the spacecraft overhead, then transmitted back to Earth." [63]

Further Details:

--*Galileo* Probe was released from the *Galileo* Orbiter in July;

--Entered the atmosphere of *Jupiter*: 2204 UTC on Dec 7 (latitude 6.5 deg N, longitude 4.4 deg W)

--On-board timer activation: 1600 UTC after 5 months dormancy.

--*"At 2311 UTC confirmation was received on Earth that the Orbiter was receiving data from the Probe."*

--Parachute deployment: 2206 UTC; a few seconds later: deceleration module (heatshield) jettisoned.

--Continues transmitting data until 2319 UTC

"Theoretical analysis indicates that the probe parachute would melt at 2349 UTC and the [aluminum] internal probe equipment, …would melt around 0030 UTC with the probe's titanium structure surviving much deeper into the atmosphere, disintegrating at around 0700 UTC on Dec 8." [64]

Note, in the above report nothing is mentioned of the **much sturdier** pellets' fate (LWRHU's). Titanium melts at around **half** the temperature that the graphite (carbon) casings of the LWRHU's begin to break down under normal pressures, and we will show how the casings kept increasing their melting point to survive intact until about 3 million bars pressure, then the **Pt-30Rh protective alloy clad** took over from there (as more pressure is applied, the melting point increased for these items).

Los Alamos National Laboratory was heavily involved in the design of the various fuel pellet units. Some of the LWRHU design parameters are discussed below.

> *"A design effort at Los Alamos National Laboratory on a new light-weight radioisotope heater unit focused on methods of increasing the power density of the unit and its high temperature oxidation resistance. Because the weight and bulk of a multilayer containment system significantly reduced the power density, a decision was made early-on to utilise a vented capsule design. Although the proposed use of a frit-vent permitted the helium produced by α-decay of the 238PuO2 to escape, and precluded the need for heavy pressure-vessel type containment, it increased the importance of the required oxidation resistance of the clad. As a result, the primary requirements for the LWRHU cladding were defined as:*
>
> *• a melting or eutectic point at least 200°C above the maximum predicted temperature during atmospheric re-entry,*
>
> *• sufficient strength and ductility to survive impact with the Earth with no loss of containment, and*
>
> *• chemical compatibility with both carbon (present in the graphite aeroshell surrounding the capsule) and oxygen over the range of operating and re-entry temperatures."* [65]

The following diagram is a closer look at the actual **fuel clad** portion of the LWHRU. The clad can be classified as a **"thick-walled cylindrical vessel"** because the thickness of its walls is *greater* than 10% of its radius (0.875/4.3 = 0.203). In this case it is actual greater than 20%.

> *"For the thin-walled assumption to be valid the vessel must have a wall thickness of no more than about one-tenth (often cited as one twentieth) of its radius."* [66]

As such the clad has greater stability for its side walls overall. It is the contention here that with a "vessel" full of solid matter inside a thick-walled container, the vessel (the clad and fuel pellet) will more or less be compressed evenly from all sides into an irregular oval spheroid or a prolate spheroid.

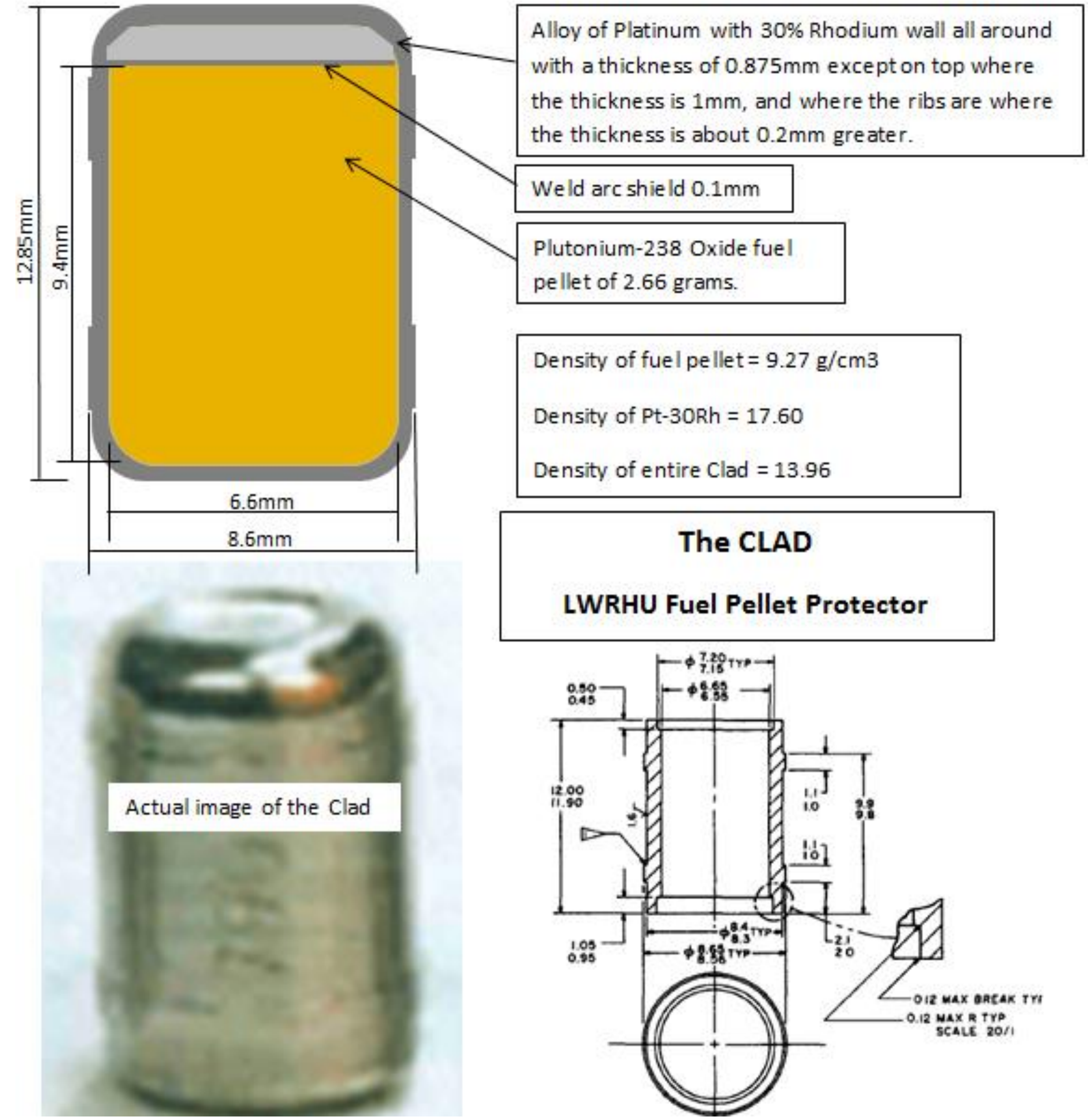


Figure 29– The CLAD – LWRHU Fuel Pellet Protector [61, 65]

"These graphite components [LWRHU casings] control the overall thermal balance of the heat source and enhance the performance of the fuel cladding in accident conditions." [65]

"The fuelled [sic] capsule consists of a pressed and sintered plutonia pellet weighing 2.7 g encapsulated in a 0.875 mm thick shell of platinum-30 per cent rhodium (Pt-30%Rh) alloy. This capsule, identified as the "clad" ….. is 12.85 mm long and 8.60 mm in diameter at its two ribs." [65]

Below is a summary of the density-mass-volume of the LWRHU components.

Component	D (g/cm3)	M (g)	V (cm3)
PuO2 fuel pellet	9.27	2.66	0.29
Pt-30Rh cladding	17.60	6.51	0.37
Inner carbon sleeve	-		0.54
Other carbon sleeves	-		3.94
Total Insulation	1.75	7.83	4.48
Inner cavity	*1.96*	***17.00***	*5.13*
FWPF aeroshell		***23.00***	*11.74*
LWRHU capsule		***40.00***	*16.87*

Figure 30– Volume, Mass, and Density Breakdowns of Various Components of a LWRHU [67]

Note: the above table nets **2.37**g/cm^3 for the starting density of the entire LWRHU capsule (9.27g/c m^3 for fuel pellet only).

To reiterate, because 17 LWHRU's went in behind a heat shield that protected GAEP during Jovian entry, all 17 survived to fall deeper into *Jupiter* on 12-7-95. Another 103 LWRHU's went in with GSC on 9-21-2003. We can assume a few of these also survived.

The next section will analyze just how far the various G-R Clad/Fuel Pellets and LWRHU Clad/Fuel Pellets were able to drop and drift down into Jovian depths.

6-Analyzing the Radioisotope Fuel Pellets in Jovian Conditions

Below is an equation of state diagram for **carbon** at high pressures and temperatures.

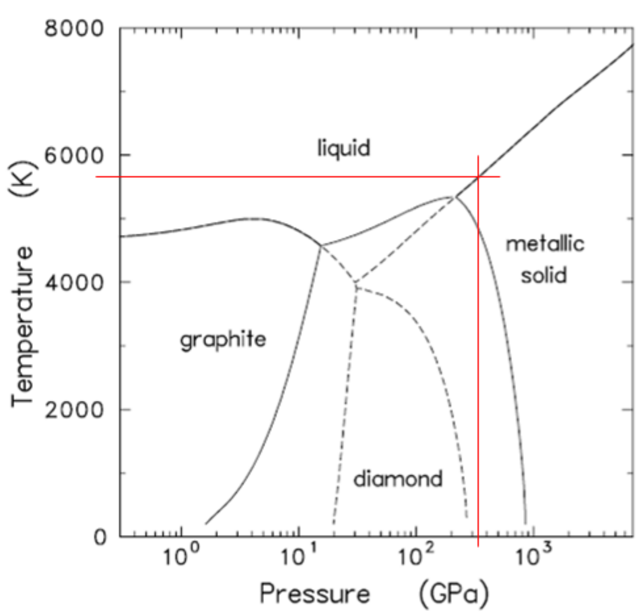
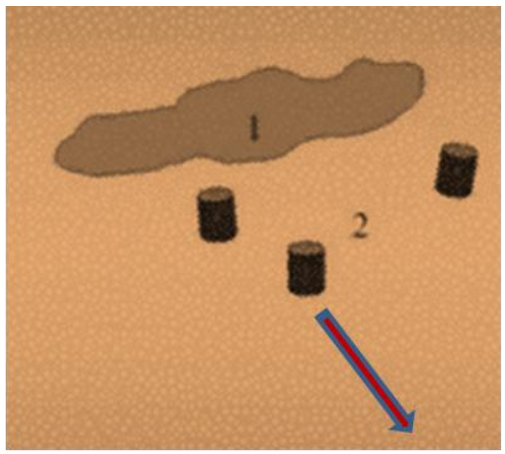


Figure 31 – Carbon Phase Diagram (red lines have been added by author to show estimated melt point inside Jupiter) [68]

Crucial to theory is showing the equation of state for carbon, iridium and platinum. Carbon's phase diagram is shown above, and is pertinent as the G-R fuel pellet aeroshell, carbon sleeves and the LWRHU's casing protection for the inner plutonium-238 oxide is made of carbon/pyrolitic graphite (graphite is carbon). These systems were made to withstand nearly any kind of shock, and tremendous heat in order to pass safety standards in case of an accidental mishap during launch over Earth and the phase diagram shows, highlighted in red lines, a melting point at 3.15 million bars and 5,700 Kelvin. This is about the point where Jovian conditions indicate that carbon will finally reach melting state.

For the surviving plutonium-laden capsules, they would have started at 2.4x their Earth weight at *Jupiter*'s cloud tops initially, and then increased in weight and density as *Jupiter*'s acceleration of gravity and pressure increased inside. As the carbon casings melted off at 3+ million bars, (23% into *Jupiter*), well into the estimated Jovian metallic hydrogen realm, the Pu-oxide fuel would continue to be contained and protected by the even sturdier **platinum - 30% rhodium clads (LWRHU Fuel pellets) and DOP-26 iridium clads (G-R fuel pellets)**, the last wall of protection. After the carbon elements melted away, the density and acceleration of gravity would keep increasing for the clad/pellet sections.

This LWRHU clad is composed of 70% platinum and 30% rhodium by weight and was chosen for its very high melting temperature, its ability not to oxidize, and its superior ductility. Likewise the G-R clad although mostly iridium, has tiny amounts of other metals added to increase its ductility under high pressure. *Iridium* naturally has the ability to not oxidize and has one of the highest melting points available.



Equation of state estimates of carbon, platinum with 30% rhodium alloy and DOP-26 iridium alloy indicates that the extremely robust clad and fuel pellet components inserted into Jupiter (and Saturn) survive various depths of Jupiter intact without melting, some even past 65% depth.

Also important data for explaining our hypothesis, below is a melting curve of platinum (adding rhodium should only improve the solidity since it starts with a higher melting point than platinum). As can be seen, Pt performs very well even at extreme temperatures and pressures posting a melting point of 15,000 K at 3.5 million bars. The "rhcp" and "fcc" shown are different solid states of platinum with different crystalline structures (fcc = "face-centered-cubic", for instance).

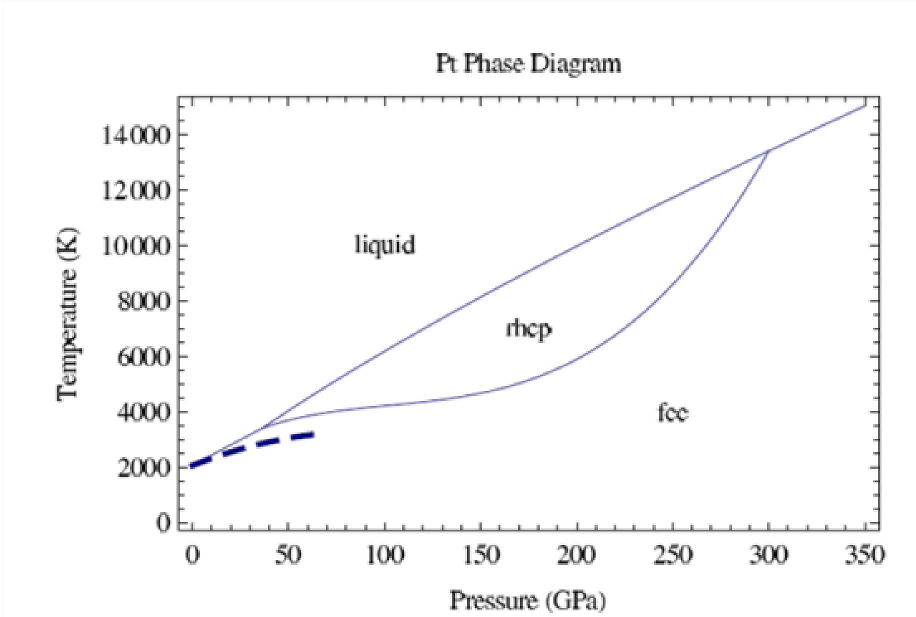


Figure 32 – Platinum Melting Curve [69]

DOP-26 Iridium, as was used as the shell for the GPHS-RTG fuel pellets, should have a similar profile as platinum shown above.

Examining the diagram below one can see that the effect that *Jupiter* conditions have on platinum, iridium and carbon. Three profiles are provided for *Jupiter* because there is some guesswork on what goes on at the depths.

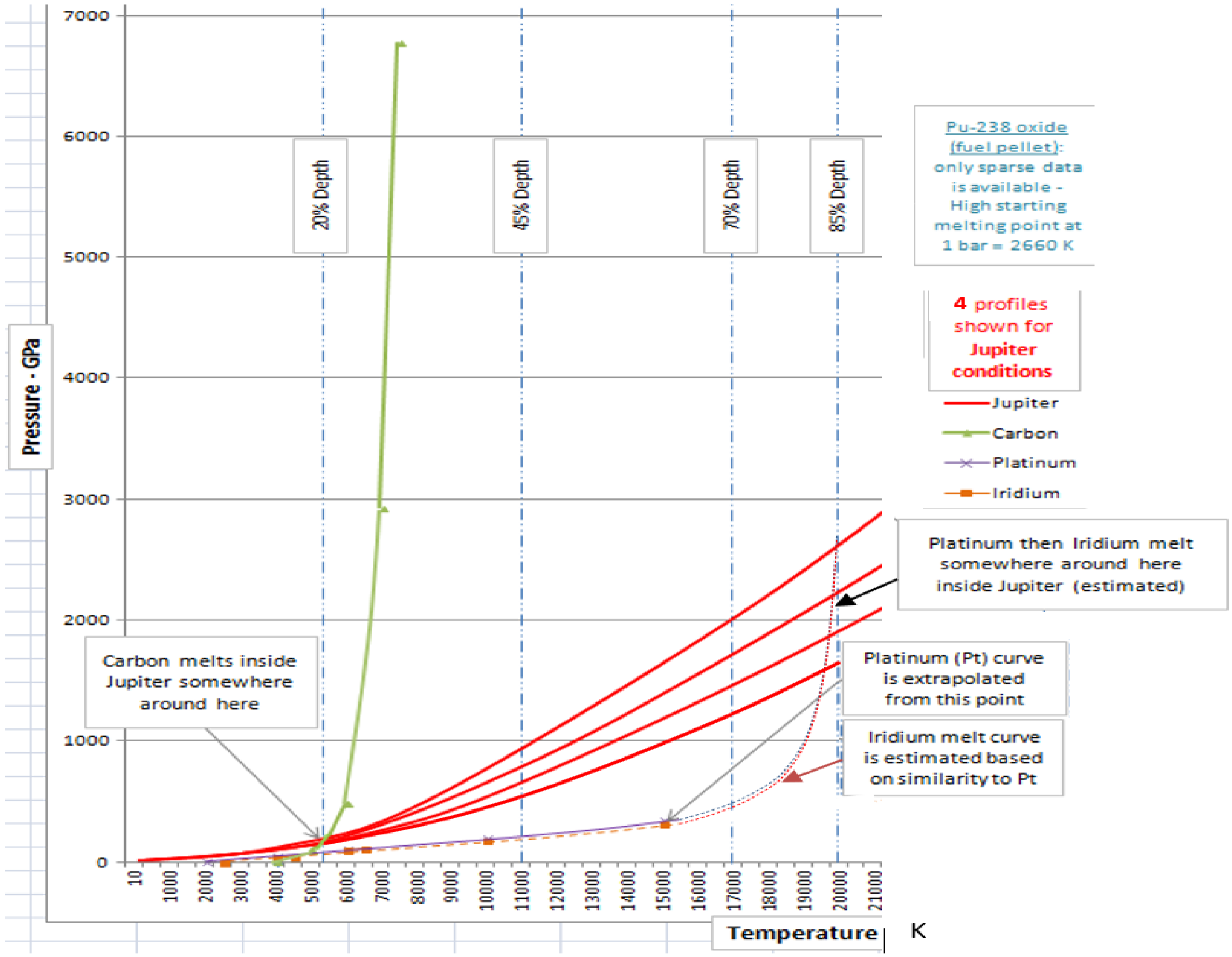
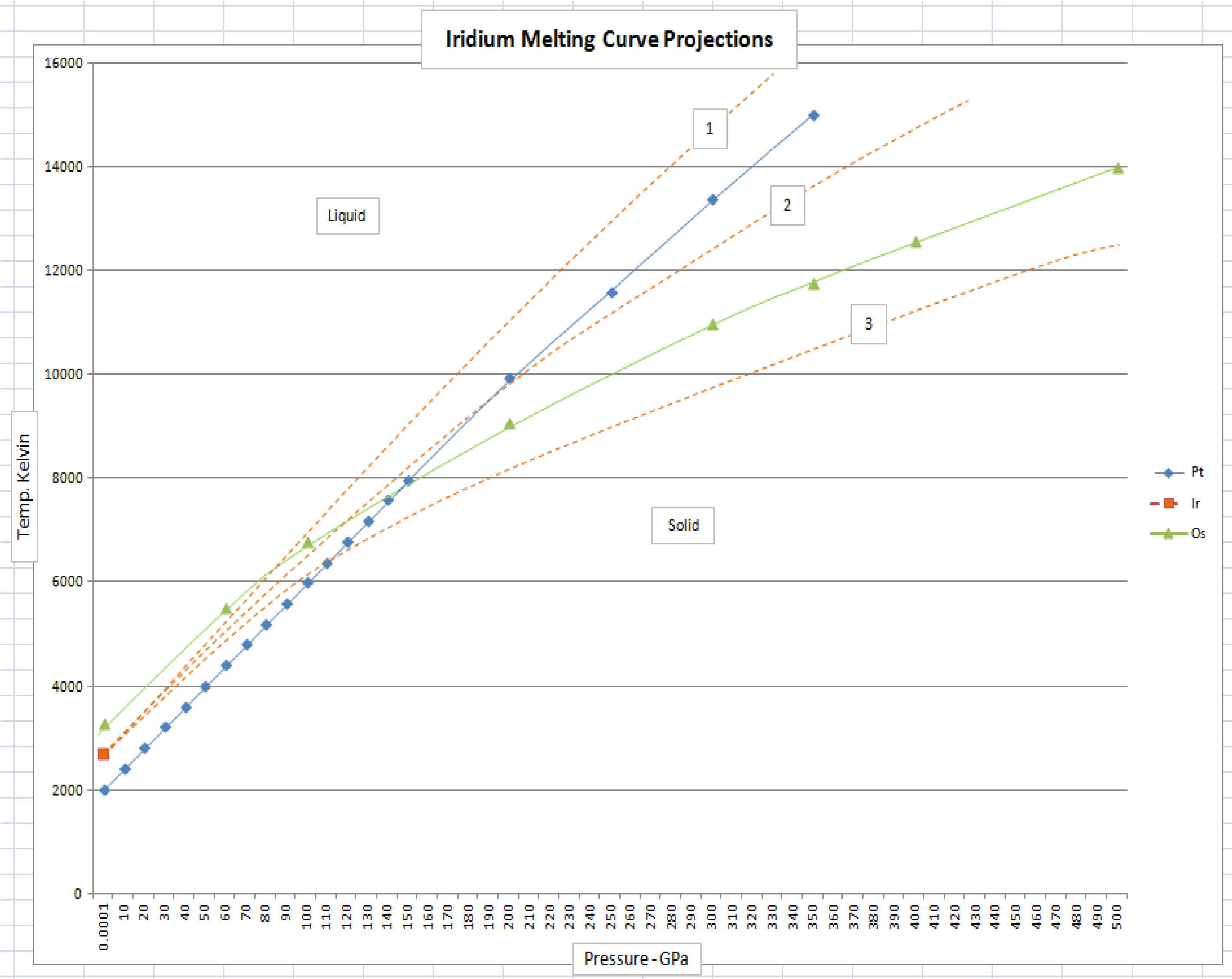


Figure 33 – Estimated Survivability of Man-made Components at Jovian Depths [68-70]

As can be seen in the phase diagrams above, the clads, and therefore Pu fuel, survive much, much longer than the outer carbon casings.

Figure 33 illustrates that indeed, the fuel pellets had a very good chance of survival to extreme depths of *Jupiter* capitalizing on the equation of state formulas for platinum-based metals (iridium is a "platinum-like metal"). As more Jovian pressure is applied, the melting point for the materials increases. The platinum melting curve is *estimated* in **Figure 33** from 350 GPa pressure and onward based on **Figure 32** information (1 GPa = 10,000 bars).

In **Figure 34** there are three projections for the melting curve of Iridium since no curve is publicly available. The projections are purely based on Iridium likely being similar to the two elements on either side of it, *Platinum* and *Osmium*. Curve #1 from **Figure 34** is used in **Figure 33** for Iridium.



Three projections for Iridium (#77) are shown above in dashed orange lines based on the performance of Platinum (#78) and Osmium (#76) on their melting curves.

1 Iridium overperforms Platinum at higher levels.

2 Iridium underperforms Platinum at higher levels.

3 Iridium underperforms Osmium at higher levels.

Figure 34 – Iridium Partial Melting Curve Projections [70]

Iridium would seem to be most like platinum, one element away from each other on the *periodic table* and both starting out with the face-centered, cubic structure.

Are "Platinum Metals" like Iridium the Key to Jovian and Saturnian Survival in the Deeps?

If indeed there is a chance that **Iridium** and **Platinum** perform very well inside *Jupiter* to the point of staying intact and not melting until extremely deep, this means we now need to analyze the contents inside of these GPHS-RTG fuel pellets and LWRHU fuel pellets since we are dealing with a fissile and fissionable substance, *plutonium-238 dioxide* (a significant part of which is Pu-239). **If it can be shown that our scenario is "explosive" to the point of creating enough heat for a Jovian (and *Saturn*ian) fusion nuclear reaction, we have revealed a possible mechanism for all of the strange *Jupiter* events since 2009.**

Viability of Pu-238 Oxide as Fissionable/Fissile and The *Fractional Crit* Method: How Subcritical is transformed to Supercritical through Density Increase

Despite Pu-238 being the weakest kind of plutonium, can this Pu-238/239 mix (plutonium dioxide or oxide, the kind that was on *Galileo's RTG's and LWRHU's; "oxide" and "dioxide" are used interchangeably*) be used to get some sort of fissionable, fissile critical mass explosion? The answer is "YES".

From the U.S. Department of energy referring to a similar mix of plutonium:

> *"A successful test was conducted in 1962, which used reactor-grade plutonium in the nuclear explosive in place of weapon-grade plutonium. The yield was less than 20 kilotons…This test was conducted to obtain nuclear design information concerning the feasibility of using reactor-grade plutonium as the nuclear explosive material. The test confirmed that reactor-grade plutonium could be used to make a nuclear explosive. This fact was declassified in July 1977…"* [71]

"Reactor grade" plutonium is in essence very similar to the Pu-238 mix used on *Galileo* and *Cassini* missions.

From a site called "About Plutonium Bombs":

> *"Critical mass*
>
> *Critical masses can be calculated quite accurately. **The important parameters are fission cross sections, the average neutron yield upon fission, and the mass density**. The latter depends heavier on the integrity of the metal lattice than on the isotopic composition, since mass differences between the different plutonium isotopes are almost negligible.*
>
> *Without a neutron reflecting shield, pure Pu-239 metal has a critical mass of 10 kg, **and I have calculated that for a "reactor grade" isotopic mixture this would be 18 kg.** Using a 15 cm U-238 shield, the Pu-239 critical mass is only slightly over 4 kg, **while for LWR -produced plutonium (65% thermal fissile isotopes, fuel burn up around 40 MWd/kg HM) this is some 7 kg**."*
> (Bolding by JEC) [72-73]

More evidence from physicist Peter Zimmerman shows the viability of plutonium oxide, sometimes called Plutonium(IV), for use even as a low-yield weapon:

> *"PuO_2, along with UO_2, is used in MOX fuels for nuclear reactors. Plutonium-238 dioxide is used as fuel for several deep-space spacecraft… Physicist Peter Zimmerman, following up a suggestion by Ted Taylor, demonstrated that a low-yield (1-kiloton) nuclear weapon could be made relatively easily from plutonium oxide."* [74]

Even More evidence that Pu-238 oxide is viable for a nuclear fission explosion from "*About plutonium bombs*", based on the work of A. de Volpi and of J.C. Mark:

> *"One could even directly use plutonium in the oxyde form…" [as a bomb]* [73]

> *"Although the explosive yield [for all less weaponable plutonium isotopes] may be less predictable, it will certainly work."* [73]

Pu-238 dioxide is mostly plutonium by weight and is considered ceramic in form and texture when manufactured. Pu-238 dioxide (which also contains a significant amount of Pu-239) was also proven to be even weaponable by Richard Garwin of the *Jason Group* (see **Appendix G**), and various other nuclear institutes, in purity of 80% or less Pu-238, which the G-R's and LWRHU's qualify as since not all of their plutonium is Pu-238, but a host of other Pu isotopes including a significant amount of Pu-239 (see **Figure 39**). **To be fissile means to be capable of a sustained nuclear reaction under the right conditions. To be fissionable means it is capable of producing fission.**

> *"In conclusion, separated plutonium-- whether weapon grade or reactor grade-- poses a similar danger of misuse in nuclear weapons and must be provided similar physical protection, control, and accountancy. This has been recognized by the International Atomic Energy Agency (IAEA) from its beginning-- all plutonium (except Pu-238 of isotopic purity greater than 80%) [Our Pu-dioxide mix falls under 80% especially since it contains significant Pu-239 which is very weaponable] is regarded as equally hazardous from the point of view of diversion to nuclear weaponry."* (Brackets by JEC) [76]

The *fission to fusion* process is a standard process for hydrogen bomb set-ups. The fission makes the extreme heat spark and sets off the nuclear reaction in dense hydrogen known as fusion. Note the above report is referring to weaponable products whereas all the fuel pellet plutonium really has to do inside *Jupiter* is cause an extremely hot spark to get the process going, a very small, but sustained nuclear fission reaction (sustained long enough to produce fusion temps) only is required to get the process going. This makes it clearly viable as a catalyst for our particular scenario if what we are looking for is: "How could *Jupiter* have expelled mass to the cloud tops from its center?"

In 2003 NASA plunged the *Galileo Spacecraft* into *Jupiter* with 2 RTG's (144 G-R fuel pellets) and 103 LWRHU's. The following is from an article by physicist Jacco van der Worp referring to *Galileo Spacecraft's* 2 **RTG's** (each of these containing about 72 of 1/3 lb of Pu-238 oxide mix) well into *Jupiter*:

> *"After only a millionth of a second, the pressure causing the implosion was overcome above Nagasaki. If such an explosion were to take place in the Jovian atmosphere instead of Earth's, the outside pressure would resist the expansion a lot longer! The chain reaction could continue longer, up to three times as long perhaps, as high as 30-50% fission rate could be achieved instead of 16% [Nagasaki percentage] and the reaction temperature could shoot up to beyond 100 million degrees.*
>
> *The threshold temperature for sustained fusion is not as high as that. The exact conditions for fusion depend on a product of pressure, temperature and amount of atom nuclei able and 'willing' to fuse together (isotopes of hydrogen with neutrons in them and helium missing a neutron) into other atom nuclei.*
>
> *The Sun is estimated to have a core temperature of 15 million degrees. It runs on fusion and the pressure inside amounts to millions of bars. Chemically, the Sun and Jupiter are not that different: the Sun also mainly holds hydrogen and helium. The pressure inside Jupiter will then determine if a fusion reaction can start up due to a nuclear explosion.* ***If the product of pressure and temperature and number of fuseable nuclei is reached, a fusion reaction will start."*** (Bolding by JEC) [77]

In analyzing planetary explosion mechanisms Thomas Van Flandern wrote in "The Exploded Planet Hypothesis 2000":

"Indeed, nuclear fission chain reactions may provide the ignition temperature to set off thermonuclear reactions in stars (analogous to ignition of thermonuclear bombs)." [78]

T Van Flandern held a PhD in Astronomy and was formerly the Chief of the *Celestial Mechanics Branch of the Nautical Almanac Office* and the US Naval Observatory.

Let's examine some more findings regarding the nature of this oxide. Below is an official chart showing the various critical masses calculated for plutonium-238 oxide depending on the medium in which it is contained. In the 3rd column, "304 Stainless Steel" is chosen as an acceptable substitute for the possible conditions surrounding the oxide in our scenario. The average of the findings in that column nets "11.816 kg".

Calculated Critical Masses for ^{238}Pu Oxide Systems

Code/Data Set	Bare (kg)	Water Reflected (kg)	304 Stainless Steel Reflected (kg)	Carbon Steel Reflected (kg)
SCALE4.3; KENO-Va; ENDF/B-V, 238 gr.	25.42	19.26	11.14	12.50
MCNP4b; ENDF/B-V cont.	25.19	20.61	12.37	13.02
MCNP4b; ENDF/B-VI cont.	25.68	20.92	12.68	13.37
MCNP4b; JENDL-3.2 cont.	24.97	20.35	12.14	13.20
MONK7B; UKNDL 8220 gr.	26.44	20.70	12.68	13.61
MONK7B; JEF-2.2 13193 gr.	23.93	19.47	10.89	12.12
DANTSYS 3.0; ENDF/B-V 238 gr.	25.16	19.31	10.81	11.80
Averages:	**25.256**	**20.089**	**11.816**	**12.803**

Highlighting and averages added by JEC

Figure 35 – Calculated Kilogram Critical Masses for Pu-238 Oxide Systems [79]

The critical mass values shown above **will change** based on several things, but namely here, the density increase from external pressure applied by gas giants like *Jupiter* will cause the critical mass of a substance to be radically lowered; *Jupiter* supplies this kind of pressure change very evenly, efficiently, and naturally.

*"A critical mass is the smallest amount of fissile material needed for a sustained nuclear chain reaction. The critical mass of a fissionable material depends upon its nuclear properties (e.g. the nuclear fission cross-section), its density, its shape, its enrichment, its purity, its temperature and its surroundings…**The higher the density, the lower the critical mass.**"* (Bolding of text by JEC) [80]

Nuclide	Half life (y)	Critical mass (kg)	Diameter (cm)	Ref
uranium-233	159,200	15	11	[2]
uranium-235	704,000,000	52	17	[2]
neptunium-236	154,000	7	8.7	[3]
neptunium-237	2,144,000	60	18	[4][5]
plutonium-238	87.7	9.04–10.07	9.5–9.9	[6]
plutonium-239	24,110	10	9.9	[2][6]
plutonium-240	6561	40	15	[2]
plutonium-241	14.3	12	10.5	[7]
plutonium-242	375,000	75–100	19–21	[7]
americium-241	432.2	55–77	20–23	[8]
americium-242	141	9–14	11–13	[8]

Figure 36 – Critical Mass of Various Plutonium Isotopes [80]

For reference, the partial table above shows the critical mass (bare sphere) of plutonium only (not oxide form) for the various isotopes.

The physics of such events that we are proposing dictates that when a fissile substance, such as our plutonium mix, undergoes a massive density increase; this creates a supercritical situation where there was not one before. Just a few thousands or less miles into *Jupiter* an object will naturally starts experiencing over 100,000 bars of pressure on all sides evenly, and this is the same mechanism used for a fissile weapon where pressure is applied evenly on all sides by a center-directed explosive charge, but happening in *Jupiter*, it is even more constrained and efficient and there is evidence that the unique properties of plutonium cause an instant and sudden volume change upon any phase change, therefore an instant density change, under high pressure.

As Richard Hoagland stated in 2003 when referring to the larger 1/3 lb. plutonium G-R pellets inside *Jupiter*:

> *"…The depth where those pressures would cause the plutonium-238 capsules to undergo a **sudden phase transition**, to literally implode … initiating a violent nuclear reaction…"* (Bolding of text by JEC) [82]

Below is a chart showing the drastic volume changes that come with any plutonium phase change.

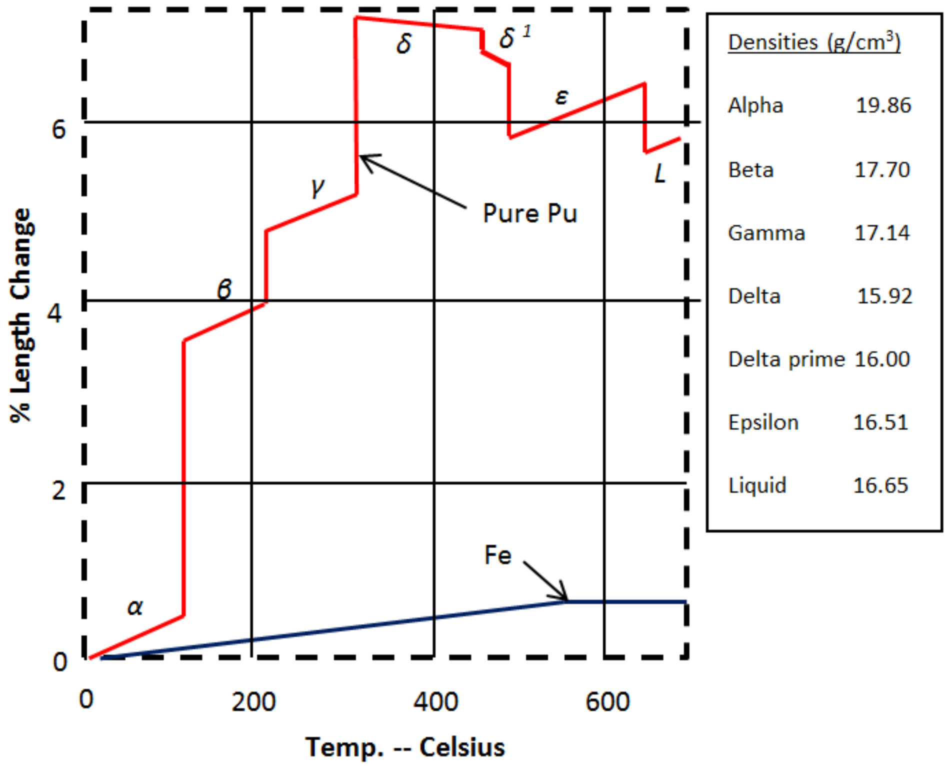


Figure 37 – Abrupt Plutonium Volume Changes due to Phase Changes [86]

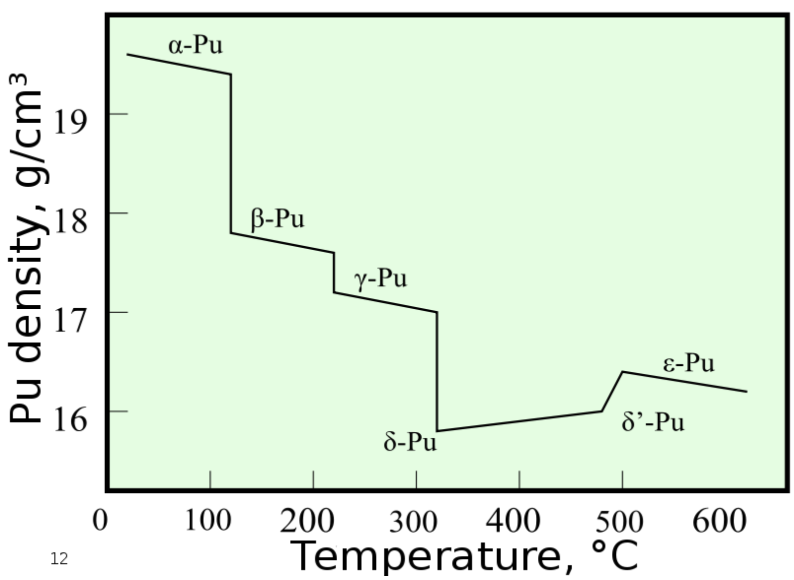


Figure 38 – Abrupt Plutonium Density Changes due to Phase Changes [84]

This "phase change" referred to is any one of the various adjustments that plutonium undergoes (as shown above) under tremendous pressure causing it to suddenly change in volume initiating supercriticality. We presume a type of special phase change like this is available at the level of 10's of millions of bars in the "Jovian deeps" (around 70% depth for *Jupiter*, around 80% depth for *Saturn*), especially considering that plutonium's equation of state may allow all sorts of options. **Pu-238 when combined into its oxide form has an incredibly high normal melting point: 2,390 Celsius or 2,660 Kelvin. This melting point would increase as more pressure is applied, as normal *equation of state* formulas suggest.** [85]

Another reiteration from a 1983 article talks about the radical phase changes of plutonium:

> *"Most phase transitions in plutonium are accompanied by large length and thus volume changes."* [83]

Also from the same text source is a table (**Figure 37** above) showing the rapid volume changes associated with any change of phase in plutonium, with the much more "sedate behavior" of iron also shown.

Knowing these facts it is prudent to assume that any plutonium phase change, even under different conditions of temperature and pressure in the EOS, causes an abrupt change in volume and it is known and shown above that the phase change to **liquid (L)** actually causes an INCREASE in *density* for plutonium of +2.5% (compare *end* of Epsilon to *beginning* of Liquid). This is another unusual characteristic of Pu. Plutonium also has another very high pressure state of which it is hard to find any information on. The state is called *Zeta*. One should assume any change to this *Zeta* state will cause either an abrupt increase or decrease in density. Also mentioned is the standard *Delta* to *special Alpha* phase which instantly increases density in the same manner (more than +3% instantly) during a typical plutonium weapon fission scheme. [86]

Here are some observations regarding the "pre-initiation" problem, which is: preventing Pu-oxide from a *fizzle* that would make it incapable of making an efficient fission reaction. Fizzles happen when the final coming together of supercriticality conditions is not quick enough or efficient enough.

--First off as we have mentioned, plutonium has several phases, all known so far show that any phase change causes it to change volume rapidly and instantly.

--Secondly, for the process we are talking about here, no "weapon" is needed. In other words, *efficiency* in the fission explosion is *absolutely not necessary*. In fact an extremely tiny amount of plutonium-238 oxide going into fission chain reaction at the right time and right depth is all that is required to give the "spark" for *fusion*. All that is required is that <u>at one small point inside the *Jovian (or Saturnian) deeps* **sufficient fusion heat** is produced</u> – one tiny reaction, no "fission bomb conditions" are necessary. This removes most of the burden of showing an efficient reaction is possible – it's not necessary; ANY small, partially sustained nuclear fission reaction will do, therefore most of the material in any potential fission reaction can actually fail to fission *as long as some does succeed* in causing a chain reaction long enough to produce fusion temps.

--Thirdly, just as with iridium, carbon, and platinum, plutonium also has an "equation of state" which changes its melting point based on the outside pressure applied. The pressure would change other conditional phase characteristics too. This is classified information so we have to guess based on the charts that *have* been released. From what we have seen we have to assume it is very possible to get the right combination with the right phase change.

As can be seen from **Figure 35** earlier (the third column was chosen to match our case) our Pu-238 dioxide is critical at around 11.816 kg under normal conditions; however increased density and pressure will drastically decrease this amount. The amount is either just one LWRHU fuel pellet: 0.00266 kg or just one G-R fuel pellet: .151 kg, so quite a bit of "compressing" is required to reach supercritical, but much less with the latter G-R fuel pellet. Also note the other factors: tamper, reflector, shape, temperature, surroundings, etc.

Figure 39 below further analyzes the actual make-up of Pu-238 oxide. As mentioned before, the plutonium oxide mix is quite complex and not just Pu-238. Additionally, as shown by the "Half Life" of Pu-238 and Pu-239, over time, very fissile isotopes like Pu-239 will increase in proportion to ones not as fissile, having a longer half-life.

Fuel Component [PuO_2 mix]	Weight % at Launch	Half Life (years)	Specific Activity (curies/gram) Pu	Total curies/RTG at launch
Pu-236	0.0000010	2.851	531.3	0.06
Pu-238	**70.810**	**87.75**	17.12	130,925.20
Pu-239	**12.859**	**24,131**	0.0620	86.11
Pu-240	1.787	6,569	0.2267	43.75
Pu-241	0.168	14.4	103.0	1,864.30
Pu-242	0.111	375,800	0.00393	0.05
Other*	2.413	NA	NA	NA
Oxygen	11.852	NA	NA	NA

* Small amounts of long-lived actinides and stable impurities *(Bolding and red highlighting of text by J.E.C.)* [C

Figure 39 – Representative Characteristics and Isotopic Composition of Cassini RTG Fuel

(Galileo and Cassini RTG and LWRHU fuel is nearly identical % ratio) [87]

> *"Plutonium in the δ (delta) form normally exists in the 310 °C to 452 °C range but is stable at room temperature when alloyed with a small percentage of gallium, aluminum, or cerium, enhancing workability and allowing it to be welded. … The δ form has more typical metallic character, and is roughly as strong and malleable as aluminium. [sic] … **In fission weapons, the explosive shock waves used to compress a plutonium core will also cause a transition from the usual δ phase plutonium to the denser α form, significantly helping to achieve supercriticality.** The ε phase, the highest temperature solid allotrope, exhibits anomalously high atomic self-diffusion compared to other elements."* (Bolding by JEC) [88]

As can be read above, during a typical implosion scheme for fission weapons plutonium instantly switches from a *delta* phase to achieve a special *alpha* phase that is much denser. This is an important observation as "usual delta" = 15.92 and "denser alpha form" = 19.86, netting an instant density increase of +24.75%. At the high pressure levels we will look at shortly this in essence seems it would translate to at least x5 compression factor (x25 Mc) over starting conditions. Delta's 15.92 having increased already to 64.98 at 40 TPa would ultimately be increased to Alpha's 81.06 (19.86 increased to 81.06 at 40 TPa), at that instant.

This special characteristic of plutonium allows it to cross the supercriticality barrier much easier for two reasons: the quick transition foregoes the restriction of the pre-initiation or fizzle problem. In other words, less pre-mature reactions occur and hence they all occur at the same time relatively. Secondly, the simple mechanism of density increase is happening, and then even more of this effect is occurring because the revert back to *alpha* phase gives an additional boost to density because of its structure.

Note below that plutonium has the characteristic of easy compressibility.

> *"The α form has a low-symmetry monoclinic structure, hence its brittleness, strength, **compressibility**, and poor thermal conductivity."* [88]

Decreasing mass for supercriticality of Pu-238 oxide		**Items that affect critical mass (Mc)**
1 bar - Standard Conditions	*30-40 million bars - Jovian deeps*	1. Density (higher = easier to achieve Mc)
		2. Neutron Reflector (good one = easier to achieve Mc)
11.816 kg	**0.151 kg ?**	3. Tamper/Secondary Reflector (good one = easier to achieve Mc)
	0.00266 kg ?	4. Shape (closer to sphere = best shape for Mc)
	(Pu-238 oxide mass in 1 **GPHS-RHU** & **LWRHU**)	5. Add or subtract fuel (add = easier to achieve Mc)
"The critical mass of a fissionable material depends upon		6. Temperature (higher = harder to achieve Mc)
its nuclear properties (e.g. the nuclear fission cross-section),		Of the above factors, the green highlight ones increase
its density, its shape, its enrichment, its purity, its temperature		Mc potential in our scenario, the red ones deter it,
and its surroundings ...		and the blue ones are nearly neutral.
The higher the density, the lower the critical mass."		**Overall, the factors heavily favor increased Mc potential.**

Figure 40 – Decreasing Mass for Supercriticality of Pu-238 oxide inside Jupiter (Fractional Crit)

In our hypothesis, the fuel is constantly increasing in temperature as it falls into *Jupiter*, so this will be a factor that works against criticality although most of this effect is already figured into to the compression charts which assume heat of compression already; it appears likely that it is a simple inverse relationship if any accounting needs to be done at all.

> *"As fuel temperature increases, neutrons of a given energy appear faster and thus fission/absorption is less likely."*

> *"Neglecting the very important resonances, the total neutron cross section of every material exhibits an inverse relationship with relative neutron velocity." [Referring to temperature]* [89]

When addressing density here are some observations:

> *"The higher the density, the lower the critical mass."… "The critical mass is inversely proportional to the square of the density."* [80]

The *density* factor, *neutron reflector*, and *tamper* are the important factors that should overwhelm any "temperature increase" factor. For example, reducing the diameter of the LWRHU fuel pellet to 45-50% of original (thereby increasing density by ~7x or ~8x if we assume roughly an elongated prolate spheroid at this point), the *critical mass needed* is decreased by a factor of ~x64 ($1/8^2$). In this example (using density and neutron reflector factors), a critical mass of 11.816kg would be reduced to 0.184625kg if the diameter of the fuel pellet in question was compressed from 6.8mm to less than 3.4mm. This kind of massive compression (~1/2 of original diameter) may very well not be possible though even at 80 million bars pressure (volume = 1/8 of original) and still misses the mark for the smaller pellet by another ~x70 factor on top of this. Other factors would have to aid in reaching Mc, or critical mass number, for the LWRHU fuel pellet, possibly a primary and secondary reflector as discussed below; else we would have to look only to the larger **G-R fuel pellet** as the main candidate which needs much less help (a factor of x64 for instance almost does it for this one alone).

> *"Surrounding a spherical critical mass with a neutron reflector further reduces the mass needed for criticality."* [80]

A good neutron reflector, of course, we naturally have with both the G-R's Iridium and the LWRHU's Platinum-Rhodium clads that stays intact around the fuel and gets more and more compressed around the plutonium. We estimate with **Figure 35** that the *Stainless Steel Reflected* column best matches our case. This nets a factor of more than x2 extra efficiency, which is already figured into the 11.816 kg amount.

> *"In a bomb, a dense shell of material surrounding the fissile core [tamper] will contain, via inertia, the expanding fissioning material. This increases the efficiency. A tamper also tends to act as a neutron reflector."* [80]

Of course, we also have the above effect naturally in a super dense situation with the pressure at 10's of millions of bars and the outside density around 25 g/cm^3. It is hard to quantify the "tamper" in this case, but it would seem to be a very efficient one that also acts as a *secondary reflector*. This "secondary reflector" is a huge variable.

> *"A surrounding tamper may help keep the nuclear material assembled for a longer time before it blows itself apart, thus increasing the yield. The tamper often doubles as a neutron reflector."* [137]

For the *shape*, almost all critical masses are listed for ideal *sphere* shape; anything distorted from a sphere is less efficient, from slightly (like a slightly oblate or prolate spheroid), to greatly, (like an elongated bar). [80]

Critical Mass Variables General Analysis and Estimates			
Variable	When this goes dn/up or *When quality of this goes dn/up:*	Then mass needed for Critical goes:	Relationship : Magnitude
Fuel Amount	↓ ↑	↑ ↓	Direct : 1^{ST}
Temperature	↓ ↑	↓ ↑	Direct : 1^{ST} ?
Density	↓ ↑	↑ ↓	Inverse squared : $1/D^2$
Neutron Reflector	↓ ↑	↑ ↓	*Direct : est. x1/2 in our case (Pt-30Rh, actual reflector)*
Tamper	↓ ↑	↑ ↓	*Varies by type (High-pressure Jovian mass just outside the clad is a very good tamper in our case)*
Shape	↓ ↑	↑ ↓	*Direct: Sphere = ideal (= x1); else = less than ideal (= > x1); Our case = irregular oval spheroid*

Figure 41 – Critical Mass Variables, Broad Analysis and Estimates [80, 137]

Compression Discussion

What seems to be the case for the radioisotope clads and fuel is they have been designed for maximizing melting point and having high ductility or non-brittleness while the fuel pellets also have a very high melting point and are very compressible. This situation allows for the shrinking of the clad and fuel in a uniform manner which does not fracture it and allows a slow decrease in volume over time. More compressibility or a greater than average decrease in volume is allowed here as the Pu is very compressible compared to other "metals".

Here is one source regarding compressibility of solids:

"For an isotropic [uniform in all directions] body, the linear compressibility is

$$\frac{1}{L}\left(\frac{\Delta L}{\Delta p}\right) \approx \frac{1}{3}\beta$$

The compressibility of gases is very large at pressures up to 1 kbar but becomes close to that of liquids as the density of the gases approaches the density of liquids. The compressibility of liquids decreases with increasing p, at first abruptly and then very slowly. As p increases from 6 kbar to 12 kbar, β decreases by approximately the same factor as it does when p increases from 1 atm (10-3 kbar) to 1 kbar—that is, by a factor of approximately 2. At 10–12 kbar, β is 5–10 percent of its initial value. At 30–50 kbar, the K of liquids is close in order of magnitude to the K of solids. For solids at 100 kbar, Δρ/ρ0 ≈ 15–25 percent. For some substances, such as the alkali metals, Δρ/ρ ~ 40 percent, and for most other metals it is ~6–15 percent." [90]

The above reference is to linear compressibility (***p*** for pressure and ***ρ*** for density are two different symbols) and linear deformation, and states that a ***density change** for **solids*** (**Δ*ρ***) at a pressure (***p***) of 100,000 bars (100 kbar) has a general range of ***+6 to +40 percent***. Plutonium is an actinide metal, but would fall in the higher range of compressibility, shown later in **Figure 43**.

Another source below refers to compressibility of solids.

> *"The effect of pressure and temperature on the densities of liquids and solids is small. The compressibility for a typical liquid or solid is $10^{-6}bar^{-1}$ (1 bar = 0.1 MPa) and a typical thermal expansivity is 10^{-5} K^{-1}. This roughly translates into needing around ten thousand times atmospheric pressure to reduce the volume of a substance by one percent."* [91]

10,000x atmospheric pressure equals 10,000 bars for a 1% change in volume, roughly. This would increase the density by 1% also. So we have a general guide for 10,000 bars (1% increase in density for solids) and 100,000 bars (6-40% increase in density for solids), but with every level of compression it is more difficult to do further compression, so this would be a case of "diminishing returns" as we approached 30-40 million bars.

We will study more closely the specific compressibility of plutonium.

Compressibility of Plutonium

Plutonium exhibits the characteristic of being relatively easy to compress compared to other solids and as the former reference above reiterates the unusual ability of plutonium to instantly change density make it even more ideal for a fission starter.

Below are two diagrams illustrating the compression concept in our scenario.

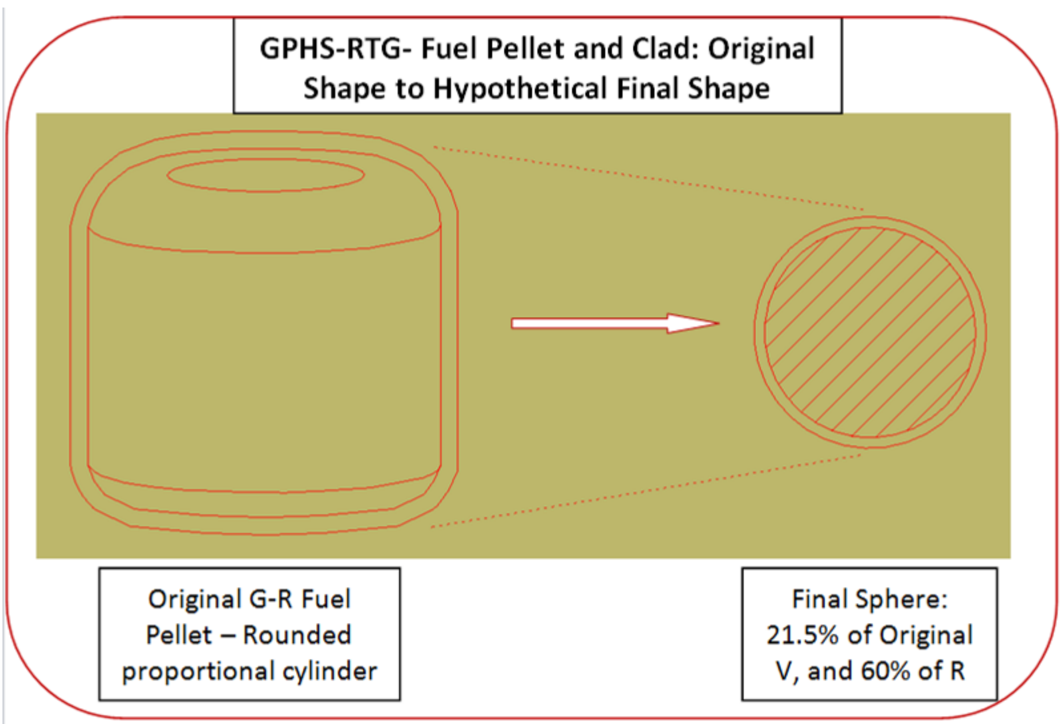


Figure 42 – Maximum Imagined Density Increase from Compression of GPHS-RTG Fuel Pellet

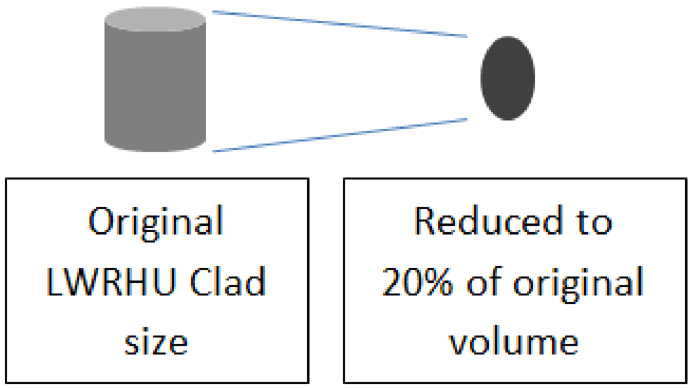


Figure 43 – Maximum imagined Density Increase from Compression of LWRHU Fuel Pellet

Now added to these characteristics of density increase are the other variables, some that help and at least one that hinders our scenario as mentioned before. *Temperature* increasing will increase the amount needed for critical mass. Also the *shape* of an irregular oval will slightly increase the amount needed for critical mass since it is not the *ideal sphere*. The *tamper as a secondary reflector* factor could be very large here to decrease the critical mass needed as *Jupiter* is applying a massive pressure directly to the outside of the spheroid.

The following information below is probably some of the most important material we stumbled upon on our search for answers. It illustrates the amount that plutonium can be compressed at extreme pressures. The "isentrope" curve is what is shown; this shows what "slowly applied pressure" does. 1 Tpa = 10 million bars.

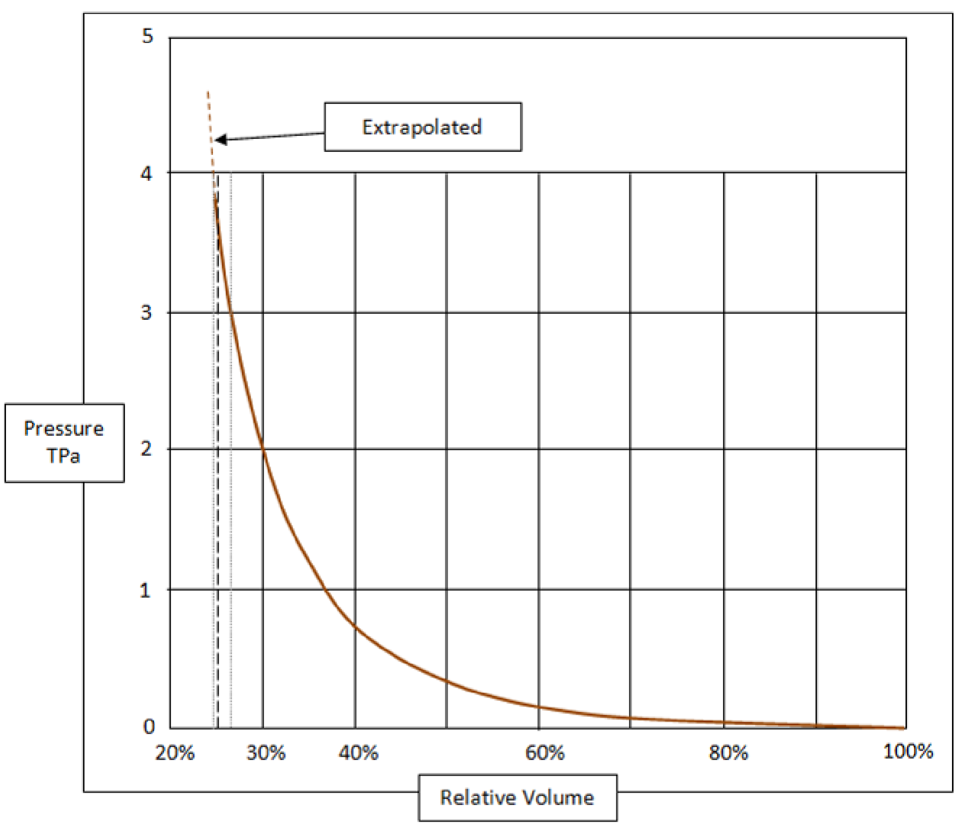


Figure 44a – Isentropic Compression of Plutonium [92-95]

Isentropic pressure (slowly applied pressure) for Plutonium (Delta phase) is shown above using *Diamond Anvil* application. 1 TPa = 10 million bars.

* Change of phase from *Delta prime* to *Epsilon* nets instant +3% increase in density. (see below) At some point at the extreme pressures the *Epsilon* phase would occur, and other phases (*Liquid, Zeta*?), or *Delta* to *special Alpha* might occur (+25%).

V%	Pressure	Multiple
*~20%	*4 TPa	*~x5
24.5%	4 TPa	x4.08
26.3%	3 TPa	x3.80
30.0%	2 TPa	x3.33
33.33%	1.3 TPa	x3.0

Phase	Crystal Structure	Density (g/cm^3)
alpha (α)	simple monoclinic	19.86
beta (β)	body-centered monoclinic	17.70
gamma (γ)	face-centered orthorhombic	17.14
delta (δ)	face-centered cubic	15.92
delta prime (δ')	body-centered tetragonal	16.00
epsilon (ε)	body-centered cubic	16.51

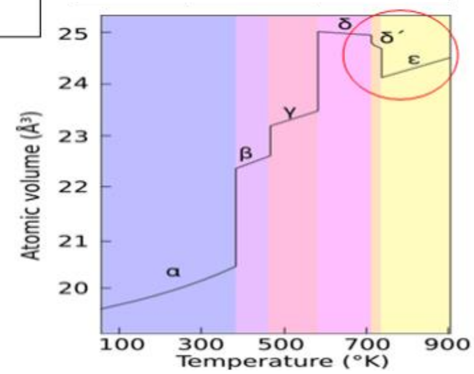


Figure 44b – Isentropic Compression of Plutonium [92-95]

7-Fractional Crit Explanation (critical stage with only a fraction of normal mass)

> *"In the case of Iran, using 93% HEU metal bare sphere with Mc of 52kg, isentropic compression by a factor of 3 decreases the critical mass by a factor of approximately 9 to about 5.8kg, and for delta phase Plutonium metal sphere, from Mc of about 16kg to about 1.8kg. To get a yield, you need a super critical mass, so add another 10%, for a total of 6.5 kg HEU and 2 kg Pu respectively."* [92]

In the example in the text above a simple calculation was made to determine how much the criticality multiple could be increased due to increasing density. As one can see 3x decrease due to *volume decrease* nets the square of this multiple when determining the new criticality number. Plutonium's Mc (critical mass) goes from 16kg to just 1.8 when the x9 factor is applied due to density increase. In a moment we will do another simple calculation like this to analyze the plutonium in one GPHS-RTG ("G-R") fuel pellet.

> *"It was known since 1943 that critical mass varies roughly with the square of the density of fissile materials, and one of the efforts during Manhattan project was to economize the scarce Plutonium needed for Fat Man- type bombs by using implosion to roughly double the density of Plutonium."* [92]

Examining the charts in **Figures 44a & b**, it appears that **at 40 Mbar** the best that can be done to compress Pu is 24-25% of original volume. Let's assume 24% at our pressure point of 40 Mbar 95% depth of *Jupiter*. This gives a factor of x4.17 density, which translates to x17.4 increase in critical mass potential. But now let's consider that when plutonium goes from *Delta* to *special Alpha phase*, as in a typical weapon set-up, the density increase for those two levels nets +25% density increase from current level status. This would roughly translate to allowing Pu to achieve *20%* of original volume at 40 Mbar, or a x5 factor netting x25 (5^2) in potential Mc increase.

If this chart is valid for isentropic pressure as the curve implies (pressure applied slowly), then it would probably eliminate the smaller LWRHU fuel pellet from contention as the culprit and we would have to look at *surviving G-R fuel pellets as the best candidate* for the strange Jovian events <u>unless</u> factors other than *density increase* are even more important for increasing supercriticality in this situation (such as the reflector/tamper factors).

"It was recognized that isentropic compression applies pressure gradually without heating the material, so there is no limit to the achievable compression if you have the driving energy. The challenge was the conversion of explosive-driven shocks to a smoothly increasing pressure ramp." [92]

Density Increase

11816 grams is our stated magic number for Pu-238 dioxide criticality as shown in **Figure 33** in an earlier chapter, and the GPHS-RTU's are listed at 151 grams giving us a factor of **~x78** to make-up. It appears that at 80 Mbar 20% volume ratio might be possible and if *Jupiter* could supply even more pressure there could be even more volume reduction as *"there is no limit…"* as stated above. Also, as mentioned, other phase changes get a volume reduction to 20% of original, but let's assume only 24% volume ratio is indeed achievable at a mark of 40 Mbar where we will consider that the Pu-oxide mass goes supercritical, since we have a very long duration isentropic compression time but also a temperature increase which works against criticality. **Note: Some of the temperature increase detriment is already figured into the curve since temperature increase automatically comes with pressure increase.**

Also, as mentioned in the quote above, we definitely have a *"smoothly increasing pressure ramp".* 24% would be a density increase of x4.17 and a critical mass potential increase of **x17.4** (this volume reduction nets a 40% *radius* reduction).

Density Increase Due to Phase Change

Now let's also consider that there will be at least an **instant** +2.5% density increase (instant -2.5% volume decrease) upon the plutonium going from *Epsilon* to *Liquid* phase as described earlier. This would mean we should actual assume we are at 21.5% volume ratio at that point (24 - 2.5). That changes the multiplier to ~**x21.63** (100/21.5 = 4.65 then squared = 21.63). That brings us to an equivalent number of 3270.46 grams, still short by a factor of x3.6, or only having 27.7% of the mass needed for critical (Mc).

Added to this (likely another multiplicative factor) is the *more efficient reflector* variable (discussed next), and the tamper variable, as well as temperature variables and shape variables. The latter shape variable can be ignored since we can imagine a *near-sphere* shape for the final G-R clad unit and since the sphere is the "ideal" shape the factor becomes x1, or no change.

Reflector Efficiency Increase

Another important point to consider is that the *DOP-26 Iridium* clad surrounding the G-R fuel pellet is constantly increasing in density and/or wall thickness around the fuel pellet; it must do one or the other or both as the irregular sphere gets smaller (at 60% of original *radius,* the *surface area* reduces to 36% of original). DOP-26 Ir has been "doped" by adding Tungsten, Thorium and Aluminum in very small amounts to make it very ductile as it reaches higher temps.

This Iridium alloy then should become a more effective neutron reflector as it molds to become denser and thicker. We could assume that the efficiency increases for the reflector at least by a direct proportion and magnitude of the *surface area* reduction from original so that the reflector would have increased its efficiency also by around x2.8 (100/36). Where a reflector normally gives a ~x2 boost to critical mass, the reflector would now be giving a total of x5.6. For our summary since the x2 reflector boost is already figured into the 11816 Mc number, the additional boost is simply **~x2.8**.

Tamper/Secondary Reflector

The natural tamper/secondary reflector is the extremely compressed Jovian (and *Saturn*ian) mass just outside the G-R fuel pellet is a good one. In fact, this tamper is actually functioning as a secondary reflector for the purpose of reflecting neutrons back in initially before the reaction occurs, aiding the start of it, and also making it more efficient after it has activated by holding the reaction it in longer. We don't have the necessary information to quantify this but it seems reasonable that "some" added benefit is here (**x1.5**? Mc).

Overall, it seems within reason to assume that this x78 can be achieved to make a ***fractional crit*** device as described below.

"Soviet scientists, particularly A'ltshuler and Zababakhin [1] refined the art of implosion by recognizing that isentropic compression could produce much higher densities than the straight shock driven implosion, and they developed the technology

*used in their nuclear weapons program in late 40's - early 50's, using multilayered graded impactors. This technique was refined in the US in the mid 50's and early 60's, making possible density increase by a factor of three, thus doubling yields, or the converse, using less fissile material in so called **"fractional crit"** weapons."* (Bolding by JEC) [92]

In summary, we are assuming the following very general parameters:

Generalized Matrix of Mc Effects Comparing G-R and LWRHU Fuel Pellets

		Grams	Factor	+Mc from Density**		-Mc Shape#	x Mc needed from added boosts ##
				Low x9	*High x25*		
	Mc Goal*:	**11816**	--	--	--		
							Need x this
Min	**G-R F.P.**	**151**	**78**	**1359**		**1359**	**8.7**
Max	**G-R F.P.**	**151**	**78**		**3775**	**3775**	**3.1**
Min	LWRHU F.P.	2.66	4442	24		*20*	580.7
Max	LWRHU F.P.	2.66	4442		67	*57*	209.0
				33.33% of V	**20% of V**		

* includes primary reflector factor

** includes general and late +2.5% density boost of pellet

\# considers LWHRU F.P. less than ideal sphere shape

\#\# boosts assumed to come from efficiency increase of denser reflectors and Jovian press.

The matrix above is a very generalized analysis of the ball park range of Mc (mass needed for critical). As one can see the LWRHU fuel pellet needs a lot of help from the reflector increase in efficiency and other Jovian factors.

As such, it seems the G-R F. P. is a better scheme, requiring only between x3 and x9 for this.

The temperature factor was not included here because in our scenario the temperature increase is due to pressure increase and should already be figured into the multiple for the isentropic pressure factor range (x3 to x5, netting x9 and x25 resp.).

Figure 45 – Matrix of General Mc Effects [92-95]

An example of a rough Mc calculation for the GPHS-RTG Fuel pellets (the large ones):

Density 2.3 g/cm^3; Temp 15000 K; 13 million bars pressure; Compression to 33.33% of volume at 80% *Saturn* depth and 67% *Jupiter* depth…. 151 x 9 (or 3^2) *x 3 for denser reflector and x 3 for denser tamper* = 12231 equivalent grams for Mc purposes. This calculation does not push the compression to the earlier assumed "maximum" but only suggests a more conservative compression of 1/3 of original volume. This calculation also does not account for the instant +2.5% density increase during the *Epsilon* to *Liquid* phase which would also help the formula net Mc and would be key if an instantaneous change is needed for the spark.

A myriad of other variables and factors would change the above generalization. This is an *extremely basic analysis*, but it is done to show a "ballpark" range that is in the right magnitude of possibility (at least for the GPHS-RTG Fuel pellets) in a similar manner that the article referred to earlier was able to calculate Mc for a "fractional crit" situation.

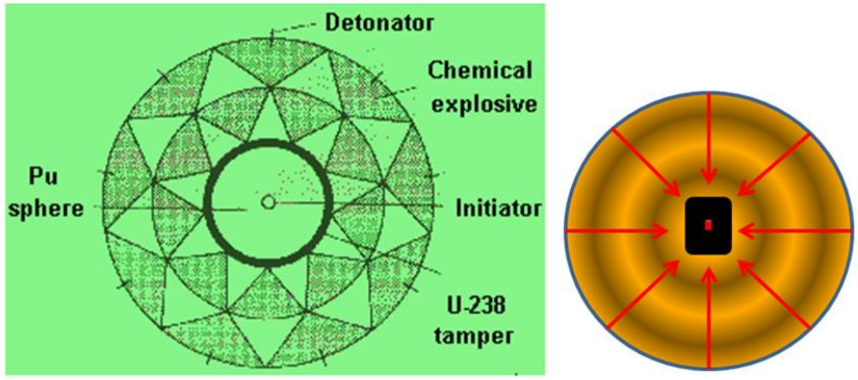


Figure 46 – Plutonium fission to fusion implosion weapon principle (left image) compared to fuel pellet implosion deep into Jupiter (right image). Massive pressure, density increase, neutron reflecting, and confinement time are supplied in both situations (confinement time is much greater on the right). Plutonium's instant volume change upon all phase changes provides another key to the success of supercriticality in both cases. [73, 77]

From a conservative point of view as to whether a viable *Fractional Crit* nuclear reaction is viable from a G-R fuel pellet, we have shown that it is probably in the right "magnitude range" for possibility at a *Saturn* depth of 80% and Jovian depth of 70% and pressures of 10 to 15 million bars if the fuel pellet can survive intact to that point.

8-GPHS-RTG Clad and LWRHU Clad Drop Time Correlation with 7M09 Event

Taking a look that the timescale for the G-R's to have been the culprit in our theory, there would have been a lapse of only 2128 days or 5.83 years.

While other knowledgeable scientists who have studied this subject have made some excellent observations concerning the velocity dynamics of the pellets, the contention that fuel pellets were able to reach supercritical at just 700 miles Jovian depth is likely mistaken.

After considering the density and improved reflector factors there does not seem to be a way to make 151 grams go supercritical at only 700 miles down (1134 km) into the Jovian atmosphere. The density would not have increased enough at that point so the event would be mostly relying on the efficiency of the reflector factor skyrocketing due to increased pressure on the outside of the pellet. This is a large variable, we agree, and we don't have the expertise to say at what rate this factor increases.

We believe it is likely these G-R items survived to fall much deeper using the estimated equation of state melting curve of DOP-26 Iridium as the ultimate last wall of protection that carries the pellets through to 70% depth *Jupiter*, 80% *Saturn*.

Assuming a 70% drop of *Jupiter* depth, for the one of the Pu-laden clad types to be the main suspect for **7M09** event the clads must have averaged one of two times:

-- **G-R fuel pellet**: An average drop velocity of around **0.9 kph** for 5 years 10 months (9-21-03 to 7-19-09).

-- **LWRHU fuel pellet**: A drop of 13 years 7½ months, since the entry of GAEP occurred on 12-7-95.

Using *Stokes' law* as a guide, these only appear to be a reasonable averages when one adds in a greater viscosity for hydrogen/helium at extreme pressures and *pressure itself* acting to slow things down, otherwise it seems that the clads would be arriving too soon for our time scale.

Stokes' law: $V = (2gr^2)(d1-d2)/9\mu$ [96]

Velocity of downward drop = [(2 x *acceleration of gravity* x *radius of unit squared*) x (*density of unit – density of medium*)] **/** 9 x *viscosity of medium*

Viscosity Discussion

When determining drop time, the viscosity of hydrogen at high temps and pressures needs to be accurately determined. This is a difficult task because viscosity at extreme Jovian-type pressures is not well-defined.

Viscosity is normally independent of pressure and its main influence is temperature, but this is not true at extreme pressures and information on liquid viscosity at the extremes of *Jupiter* is very hard to find.

> *"Viscosity is normally independent of pressure, but liquids under extreme pressure often experience an increase in viscosity."* [97]

> *"In most cases, a fluid's viscosity increases with increasing pressure. Compared to the temperature influence, liquids are influenced very little by the applied pressure. The reason is that liquids (other than gases) are almost non-compressible at low or medium pressures. For most liquids, a considerable change in pressure from 0.1 to 30 MPa causes about the same change in viscosity as a temperature change of about 1 K (1°C)."* [98]

This general effect is probably what R Hoagland is referring to when he claims the movement through high-pressure Jovian depths is slowed down more than what *Stokes Law* would seem to account for in normal conditions:

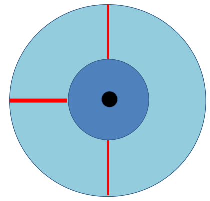
> *"If the atmospheric density increases as an object falls to greater depths, the rate of free-fall is slowed in direct proportion to the increasing density. To a first order, increasing atmospheric pressure is approximately proportional to increasing atmospheric density, and thus a decreasing rate of free-fall."* [99]

Hoagland projected that a falling LWRHU (1.3" by 1" Ø) would reach a "free-fall" speed of around 1.6 kph just a few hundred miles into *Jupiter*. Conveniently, the size of this unit is also very close to the size of the G-R fuel pellets of the RTG units, although the latter would start out heavier and denser. Hoagland's numbers only assume a relatively short trip.

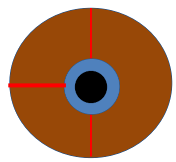
So it seems doing a general *Stokes Law* calculation may not be completely applicable for our situation since extreme pressures encountered quickly inside *Jupiter* throw a wrench into the works, but one thing that can be done is to work backwards and reverse engineer the event to a certain degree then present a couple different possible models that may get close to reality. When we do this, it appears that the estimate of a bit greater than .6 mph (just under 1 kph) for most of the trip is a good number when we consider the G-R fuel pellet journey of 5 years and 10 months.

Simple calculation at 0.6 mi per hour fuel pellet drop:

=**69%** ***Jupiter*** radius **2128 days** (9/21/03 entry to known 7/19/09 mark appearance, allowing 2 days for thrust upward)



=**82%** ***Saturn*** radius ***2128 days*** (9/15/17 entry to *predicted* **7/14/2023** (+/- a year) mark appearance, allowing 2 days for thrust upward)



Acceleration of gravity for *Jupiter* (and *Saturn*) keeps increasing to an estimated 87% depth (83% for *Saturn*) because *Jupiter* and *Saturn* are center-weighted like most planets, but *Jupiter* even more so, and the clad contents would have seriously increased their density (and melting point) all along the way to help keep them in motion downward – imagine a small oval ball with mega-dense metal falling through the consistency of extremely thick liquid mercury at just centimeters or millimeters per second (in the late stages) almost "digging" their way down.

Because of this increase in gravity and decreasing size of the unit, the clad could actually gain some speed in the mid-regions of *Jupiter* during its drop or it's possible the extra friction encountered may shift it the other way, it is hard to determine.

Below is a diagram showing the center-weighted Jovian planet and how the acceleration of gravity does not decrease the same as on a planet with mass that is uniformly distributed. Most planetary bodies are at least somewhat center-weighted. **Gas giants like *Jupiter* and *Saturn* are very center-weighted**.

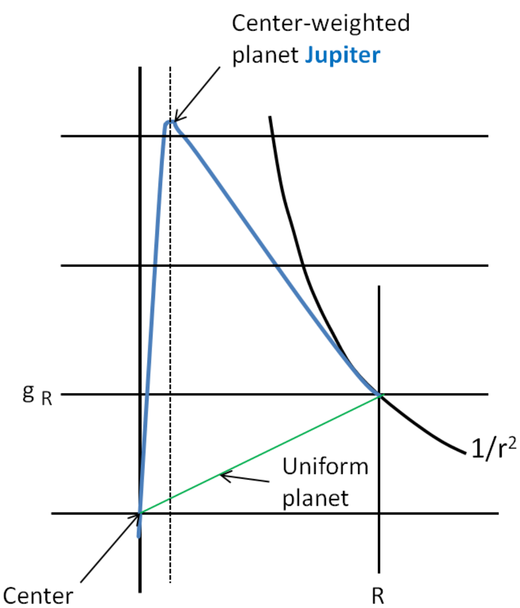


Fig. 47 – Jupiter's Estimated Increase for Acceleration of Gravity Internally [100]

The clads/pellets may have made several circumnavigations throughout their drop. As long as they stayed intact and their density remained above the surrounding medium, they kept falling steadily downward. Starting density for the G-R fuel pellet and Clad without the aeroshell would have been around 11g/c m^3, ever-increasing, and 2.37 g/cm^3 for the LWRHU set-up, also ever-increasing. The G-R module as a whole (4 fuel pellets in the aeroshell), if it managed to stay intact for a time would alter the density, size, and weight initially compared to just a single clad/pellet.

For both schemes the weight would be ever-increasing up to around 85-90% planetary depth as shown in **Figure 47**.

9-Presenting 7M09 as a Thermal Venting Shaft and (DISE) Deep Internal Slag Eruption

The diagram below shows a sequence of events that explains the surface effects seen during the **7M09** event.

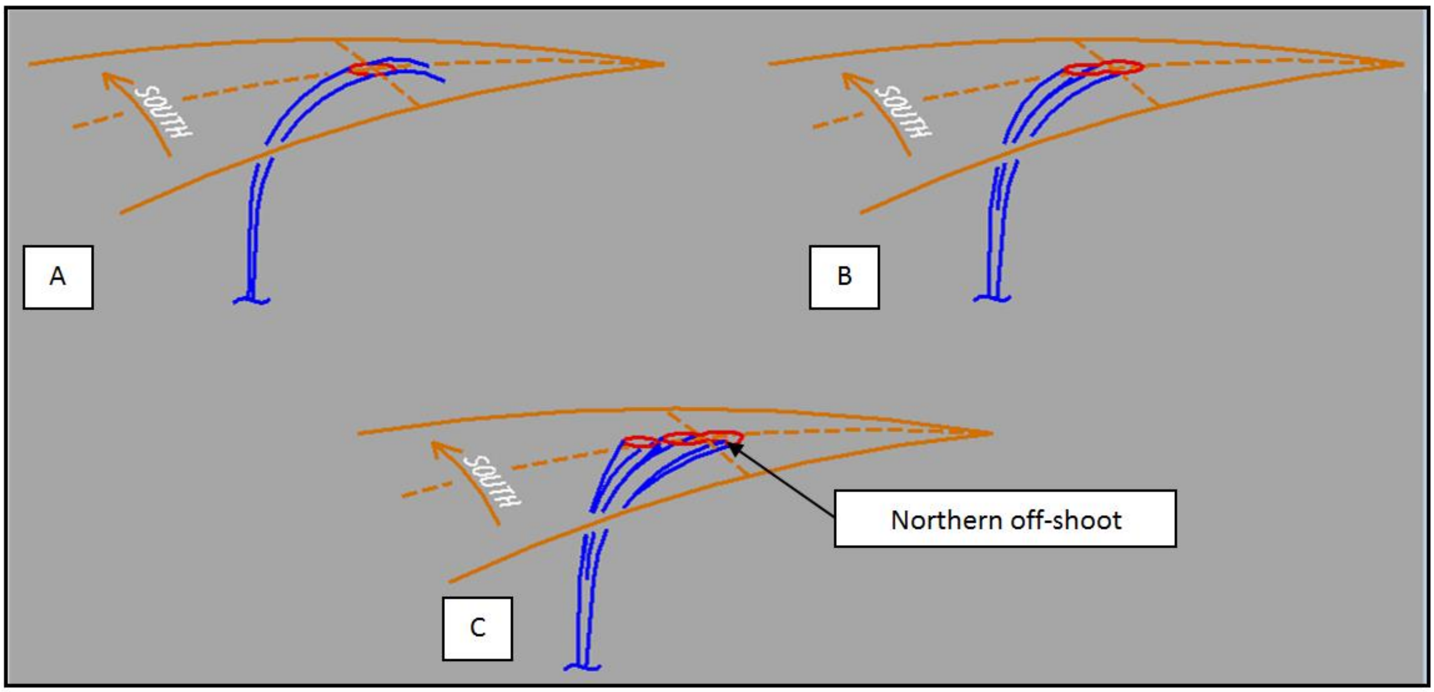


Fig. 50 – Debris Node Creation Sequence from Jovian DISE

DISE = Deep Internal Slag Eruption = Blue

Nodal surface marks = Red

Cloud top surface of *Jupiter* = Orange

We use the word **slag** for a reason. Here are two *dictionary.com* entries:

> **slag**
> *noun*
> *1. Also called cinder. The fused material formed during the smelting or refining of metals by combining the flux with gangue, impurities in the metal, etc. It usually consists of a mixture of silicates with calcium, phosphorus, sulphur, etc.*
> *2. A mass of rough fragments of pyroclastic rock and cinders derived from a volcanic eruption; scoria*
> [101]

The word "slag" for use in this work seems appropriate because the first definition implies a hot mixture of silicates and a host of other elements while the second definition gives it a suggestion of volcanic eruption scoria. We will assume that much of the material coming from *Jupiter*'s center was at first vaporized because of the drastic and violent change in density due to pressure changed that would have occurred and this would have caused extreme buoyancy conditions for the affected area.

Also, as R. Hoagland stated in his 2003 article regarding this same idea: *"The intense temperatures of this* *__nuclear plasma upwelling__* *immediately dissociate the [surroundings]…".* The silicates and carbon released from the dissociation of other elements in the depths produces an extremely dark effect at the surface. [82]

Figure 50 Notes:

--In "**A**" we see the initial surface event breaking through at ~2300 km/hr caused by a DISE some great distance below. A powerful source from below has "blown-out" to the surface a large amount of "slag". The blast was forceful enough to additionally deposit hot slag into a small "ejecta field" to the northwest while defining a fairly tight oval of initial surface penetration (July 19, 2009).

--In "**B**" we see a continuation of DISE feeding from below to distort and displace the old node while creating a new one. This effect was seen by July 23 in the Hubble image.

--In "**C**" we see new nodes further being created and old ones reformed and/or distorted by the same process, as the DISE finds news paths of low resistance. We see the first *northern off-shoot* form in the same manner.

--This process continues in the same way varying in intensity from July 19 all the way through late September before becoming undetectable from Earth.

The effects from the type of sequence shown above explain many inconsistencies that cannot be accounted for using the conventional impact theory:

1) No bow shock (halo) was observed; The DISE event does not create a bow shock only an ejecta field.

2) Movements of the elements of an impact mark should have been much more erratic than what was seen. The DISE event creates *stability* as the stream of mass from below has enough velocity to hold the event inside a smaller area of action. DISE also allows easterly movement of the nodes because *the nodes actually get created there*.

3) Abundant silica with no water present was observed in the signature of the debris (this is a huge clue). There is only one source of silica at this particular point in the solar system and *an asteroid as the source should be ruled out*. The central part of *Jupiter* is theorized to contain a large mass of silicates. This is the logical source.

4) The entire event was very long-lived, beyond what could be expected from a medium-sized impactor: at least 71 days (July 19 through September 28+).

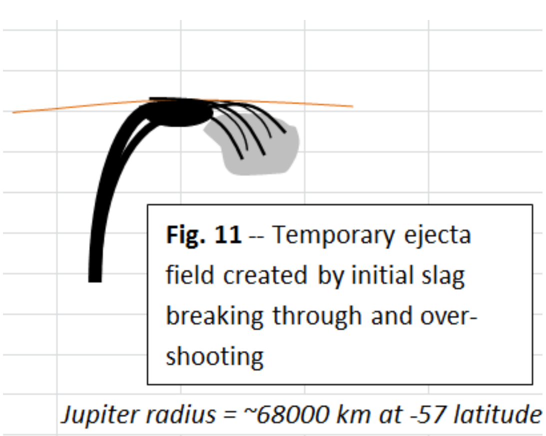
5) For the impact theory, we are approaching various *very highly improbable odds* of various impacts happening in our lifetime. To start with, impacts of this sort were supposed to be *rarely* possible as comets, but NOT asteroids. Now, to try to claim this event must be an asteroid one must not only get over the bad odds of comet impacts occurring, they must take the next step and say an unheard of rare asteroid was hanging out in the area AND, on top of that, managed to find a path to *Jupiter*.

6) No incoming object was spotted to have caused an impact. This, of course, could be attributed to bad luck, or that the object was too small to be detected beforehand.

7) Lastly, the mark suddenly appeared as obvious within a half-rotation of *Jupiter*. The DISE event is moving with enough velocity to create this effect (initially estimated at ~2300 km/hr as it broke through the surface (the DISE diminishing in velocity coming from below after this). An impact event also creates this effect, of course.

In order to create a better reproduction of the **7M09** event as proposed above a velocity model was needed to determine how much time it took for the slag from near center *Jupiter* to surface at the cloud tops. Below is a chart of one possible model that shows completion of the journey in 16 hours and allows a realistic exit velocity based on the mild debris field that was seen NW of the mark early on (estimated at ~9000km wide). The weak "ejecta field" noted in reports could have easily been created by the over-shooting of initial slag as it broke through the cloud tops.

This puts the signature *internal* event 90-95% inside *Jupiter* (0.05 - 0.10R) occurring sometime on July 18 and racing up to the surface to exit at ~2300 km/hr., 16 hours later. This seems very quick, but considering the massive pressure differential and conversion (from solid state to more voluminous states) that was occurring below, it is not unrealistic.



	kph	km	hours
surface	2300.00	6250.00	2.72
	2622.00	6250.00	2.38
	2989.08	6250.00	2.09
	3407.55	6250.00	1.83
	3884.61	6250.00	1.61
	4428.45	6250.00	1.41
	5048.44	6250.00	1.24
	5755.22	6250.00	1.09
	6560.95	6250.00	0.95
	7479.48	6250.00	0.84
central	**Total >**	**62500**	**16.16**

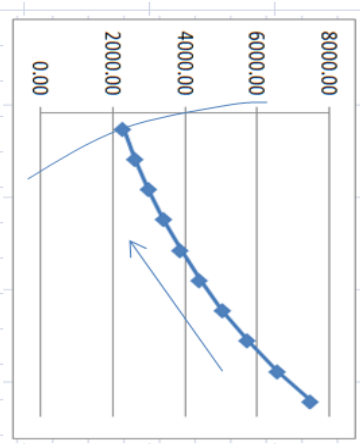


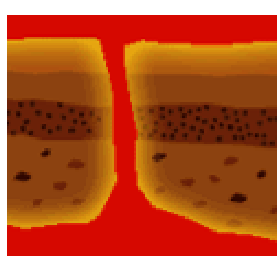
Figure 51 – DISE Velocity from Origin to Surface Arrival

The above scheme explains the change in appearance to the area to the NW of the mark in just a few hours; *there were small storms in the ejecta field area at least a day before 7/19/09*, so not all phenomena there can be attributed to "event debris".

Also note that this DISE event is not a short-lived event; continuous pressure of the same magnitude is being applied for a few weeks to complete the Jovian core liquidation, so the stream of slag had **constant massive pressure pushing it upward**. However, although the pressure was constant for months, it was ever-decreasing as the liquidation/vaporization of the core eventually was completed or in the process of completing.

So, our suggestion is that the evidence points to **7M09** (Wesley mark) being caused by a violent thermal convection shaft shooting up from deep inside *Jupiter*, similar to what can occur in the Earth's mantle during magma expulsion (**Figures 50-52**). This thermal shaft with some expelled material that we call **DISE**, a deep internal slag eruption, would have been caused by **massive pressures suddenly being allowed to escape *Jupiter*'s center** and would have caused portions of the center (slag) to be expelled to the top.

Only a *portion* of the disturbed central area was sent to the very top, as inevitably much was deposited along the way at various other strata.



A thermal convection event occurs when magma erupts from the mantle of the Earth. Hot and less dense material is forced upward with great force. In a similar way the DISE described for *Jupiter* would be forced upward with tremendous velocity. Just as magma from the Earth's mantle finds a weak point to relieve pressure from, in the same way an internal event could have erupted from a deep Jovian point finding the *weakest pressure point*. Of course, *Jupiter*'s intermediary material on the way up is various stages of metallic and liquid hydrogen under immense pressure.

Below is a simple diagram showing this concept. Such an event inside *Jupiter* would of course have to originate from a central solid area that was being quickly liquidated or vaporized due to an extreme pressure change. This would cause a tremendous density differential which would force material and heat upwards 1000's of km per hour at the beginning of the event.

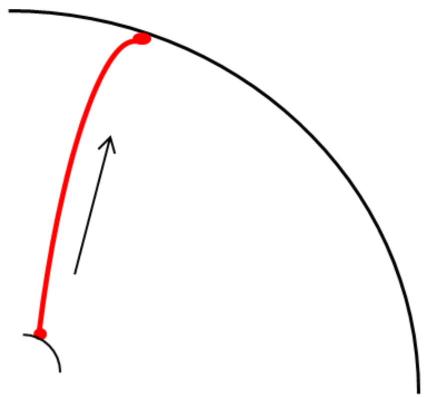


Figure 52 – Thermal Venting Shaft - Jupiter Central area to Surface [102]

The DISE can be caused by one of the clad's fuel pellets going supercritical (a fission to fusion reaction) at a point deep enough to affect a portion of *Jupiter* that contains silicates, in turn causing a nuclear plasma upwelling of material and heat. This would create the necessary pressure change to not only force the material in the immediate vicinity upward but also cause a liberating chain reaction of material further and further below until the entire core had been de-solidified and depressurized and the Jovian center equalized into a plasma fusion state.

To cause such a reaction, one should realize that there is a good chance Pu-238 oxide-laden pellets might have provided some sort of nuclear fission explosion if conditions are adequate. What is adequate in this case? The chart below attempts to summarize.

Characteristics of Pu-238 Oxide in Clads	Reasonable Assumption of Capability
Has a fissile nature (capable of a sustained nuclear reaction under the right conditions)	☑
Has a fissionable nature (capable of producing fission)	☑
May compress to super-criticality with an extreme density increase	☑
May produce an *instant* volume change to increase chances of supercriticality (avoiding enough fizzles or pre-initiations)	☑
May reach an adequate depth intact (using iridium/platinum EOS), before going super-critical to affect the Jovian center	☑

Figure 53 – Checklist of Characteristics

Such a sequence and rationale as described above, although alarming at first, adequately accounts for the events seen at the Jovian surface starting July 19, 2009.

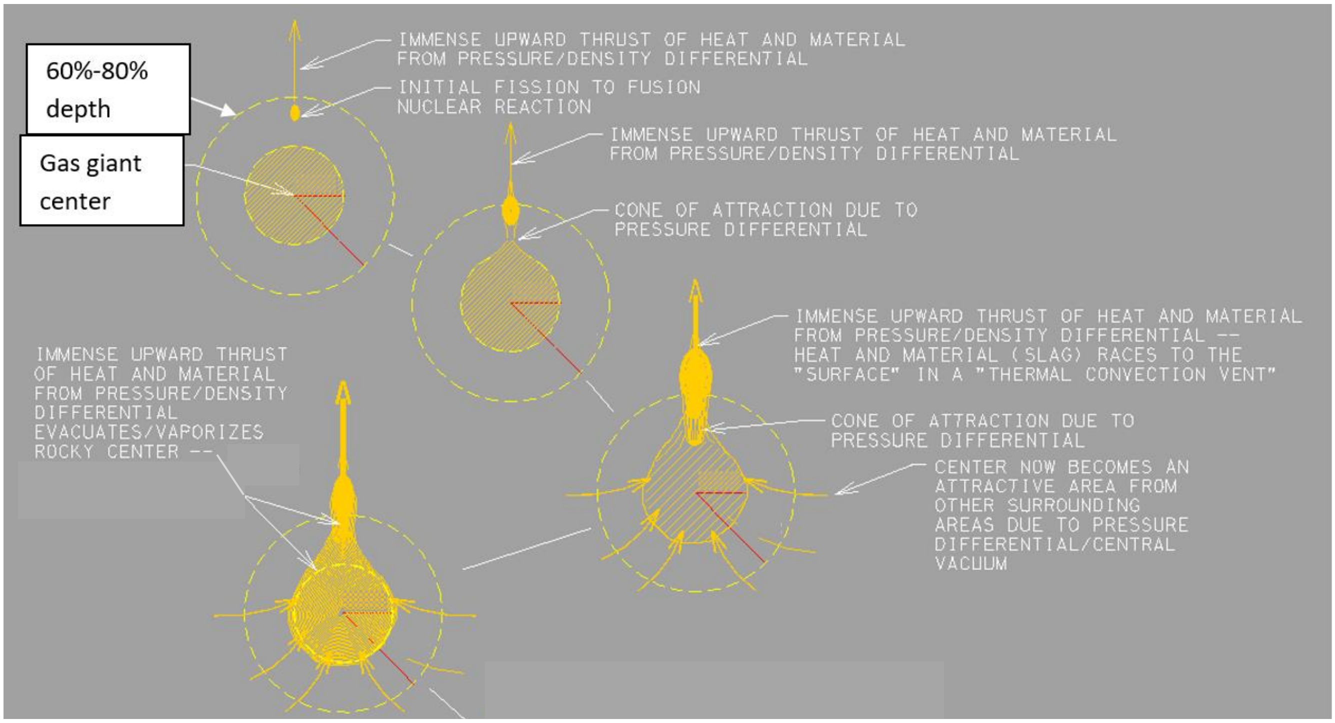


Figure 55 –Central Vaporization of Gas Giant for CTS Sequence (Jupiter and Saturn)

Above is a sequence showing the events following a *fission to fusion nuclear reaction* brought about by one of the Pu-238 fuel pellets reaching supercritical using the **Fractional Crit** method described earlier.

10-CTS Hypothesis Summary

We should then assume that:

1) At least a few (~4%) of the 144 G-R's fuel pellets survive the 2003 atmospheric entry into *Jupiter* (5 to 10 survive intact). We know that all of the 17 LWRHU fuel pellets survive from the 1995 entry, and very likely a few more from the 2003 entry.

2) 10's of millions of bars pressure is reached by at least one fuel clad inside *Jupiter* at ~70% depth and *Saturn* at ~80% depth (but before any solid phase is reached) because the melting curve for platinum/iridium type metals keeps the clad and its contents intact to that point.

3) At least x78 increase of criticality potential (fractional crit) is reached and passed (for the Pu-238 oxide mix contents) to bring down 11816 grams Mc to at least below 151 grams Mc (for the G-R fuel pellet) using primarily *density*, *improved reflector*, and *tamper/secondary reflector* as the increasers, and the very slowly ramped up isentropic pressure (to 40 Mbar). (Alternatively, but much less likely, a factor of at least x4443 is achieved for the smaller 2.66 grams fuel pellet from an LWRHU to bring about the same).

4) It is here at ~70% gas giant depths that the fuel pellet has a favorable phase change and implodes at that point for a <u>fission-fusion nuclear reaction</u> after adding an additional instant +2.5% ***or more*** density (over and above the normal compression density factor ongoing) using *Delta* to *special Alpha*, *Epsilon* to *Liquid* or possibly during a

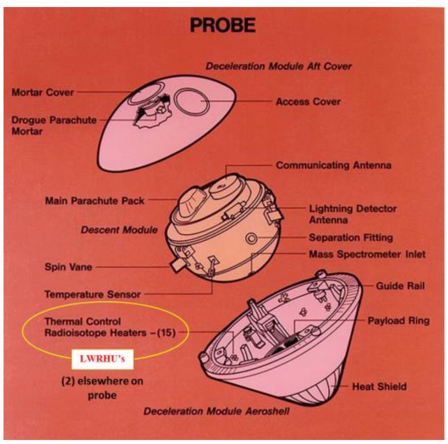
Zeta phase transition (or another unpublished or unknown phase transition) which could be even more drastic in the correct direction.

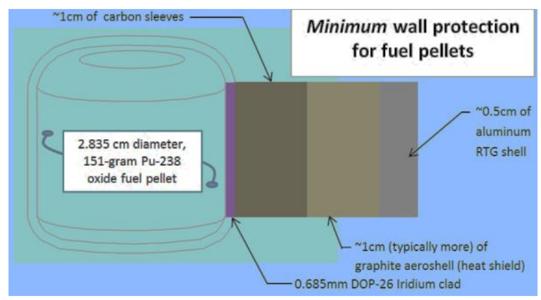
5) *Jupiter* and *Saturn* are not able to hold the initial fusion reaction past a few days, but by moving dense central mass rapidly to the surface ***Saturn alone* has a great potential to move to the next phase because of its large solid core**. See “3rd CTS – *Cassini*’s try at *Saturn* (in the near future)” for more details on *Saturn*’s attempt.

6) The liquidation and liberation of *Jupiter*’s center produced a thermal convection event (DISE) which shot upward with tremendous velocity and force bringing up some of the material from center *Jupiter* including abundant silica elements. This caused the “Wesley mark” or 7M09. Electrical breakdown voltage discharge is occurring, *“huge electron current flows”*, as *Jupiter* tries to equalize electrically inside. This is why we are seeing, and will continue to see, what amounts to many flashes at the surface of *Jupiter*.

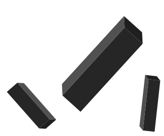
Proposed Stages of the Fuel Pellets’ Fantastic Journey

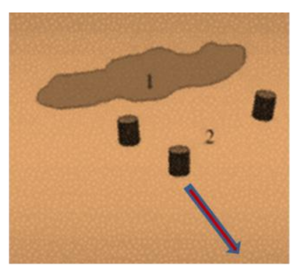
Stage 1- Fuel pellets enter into *Jupiter* intact. For GAEP, 17 small fuel pellets intact behind a heat shield; For GSC, an estimated 6 larger fuel pellets intact protected by their aeroshells with an additional several LWRHU’s (small ones) also surviving.



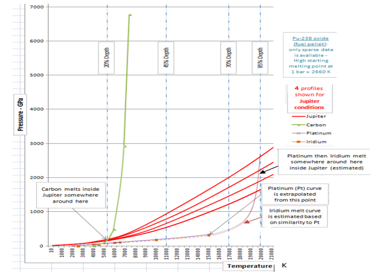


Stage 2- Fuel pellets make a slow drifting fall with possibly many convoluted circumnavigations within *Jupiter*; increasing weight and increasing density cause a self-perpetuating descent. (Weight keeps increasing because *Jupiter*’s acceleration of gravity increases to 87% of the way to its center).





Stage 3- The units eventually fall around 80% of the way into *Saturn* and 70% of the way in to *Jupiter* (from surface to center). The EOS of the clads of iridium or platinum keep them intact without melting.

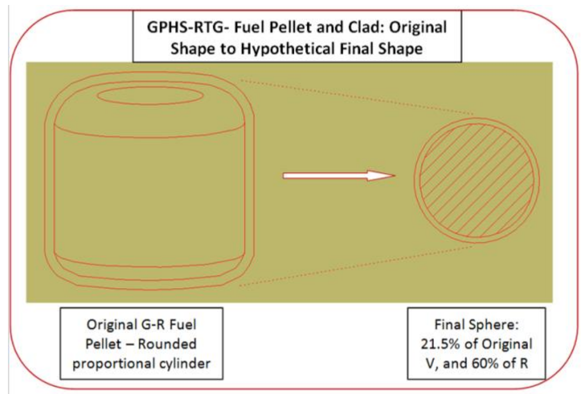


Stage 4- Critical mass is reached and passed; fission is achieved when the plutonium has reached enough compressibility and a sudden phase change (volume change in special high-pressure state to instantly increase density).

Calculated Critical Masses for ^{238}Pu Oxide Systems

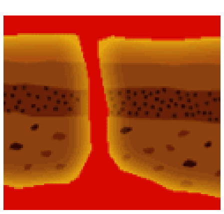
Code/Data Set	Bare (kg)	Water Reflected (kg)	304 Stainless Steel Reflected (kg)	Carbon Steel Reflected (kg)
SCALE4.3; KENO-Va; ENDF/B-V, 238 gr.	25.42	19.26	11.14	12.50
MCNP4b; ENDF/B-V cont.	25.19	20.61	12.37	13.02
MCNP4b; ENDF/B-VI cont.	25.68	20.92	12.68	13.37
MCNP4b; JENDL-3.2 cont.	24.97	20.35	12.14	13.20
MONK7B; UKNDL 8220 gr.	26.44	20.70	12.68	13.61
MONK7B; JEF-2.2 13193 gr.	23.93	19.47	10.89	12.12
DANTSYS 3.0; ENDF/B-V 238 gr.	25.16	19.31	10.81	11.80
Averages:	**25.256**	**20.089**	**11.816**	**12.803**

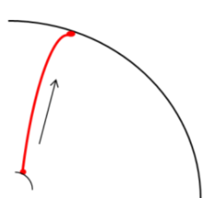
Highlighting and averages added by JEC



Stage 5- The temperatures immediately spike into the trillions Kelvin; fusion is assured in the dense hydrogen. The highly-pressurized Jovian center is violently liberated.

Jupiter is able to hold the weak fusion reaction for a short time at this extreme depth with enough forceful pressure. An intensely hot plasma bubble and heated mass form a thermal convection event with carbonized elements of *Jupiter* and elements of its liquidated-plasma center (from the on-going fusion) shoot out and up at a weak point with tremendous force from the ground zero point (Estimated at July 18-19, 2009), causing the **7M09** expulsion mark which we call DISE (Deep Internal Slag Eruption).





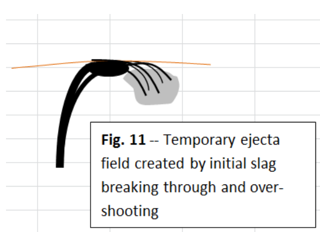


Fig. 11 -- Temporary ejecta field created by initial slag breaking through and over-shooting

Jupiter radius = ~68000 km at -57 latitude

Below (Figure 62) is a comprehensive diagram showing the significant Jovian events since 2009 and our interpretation of those events.

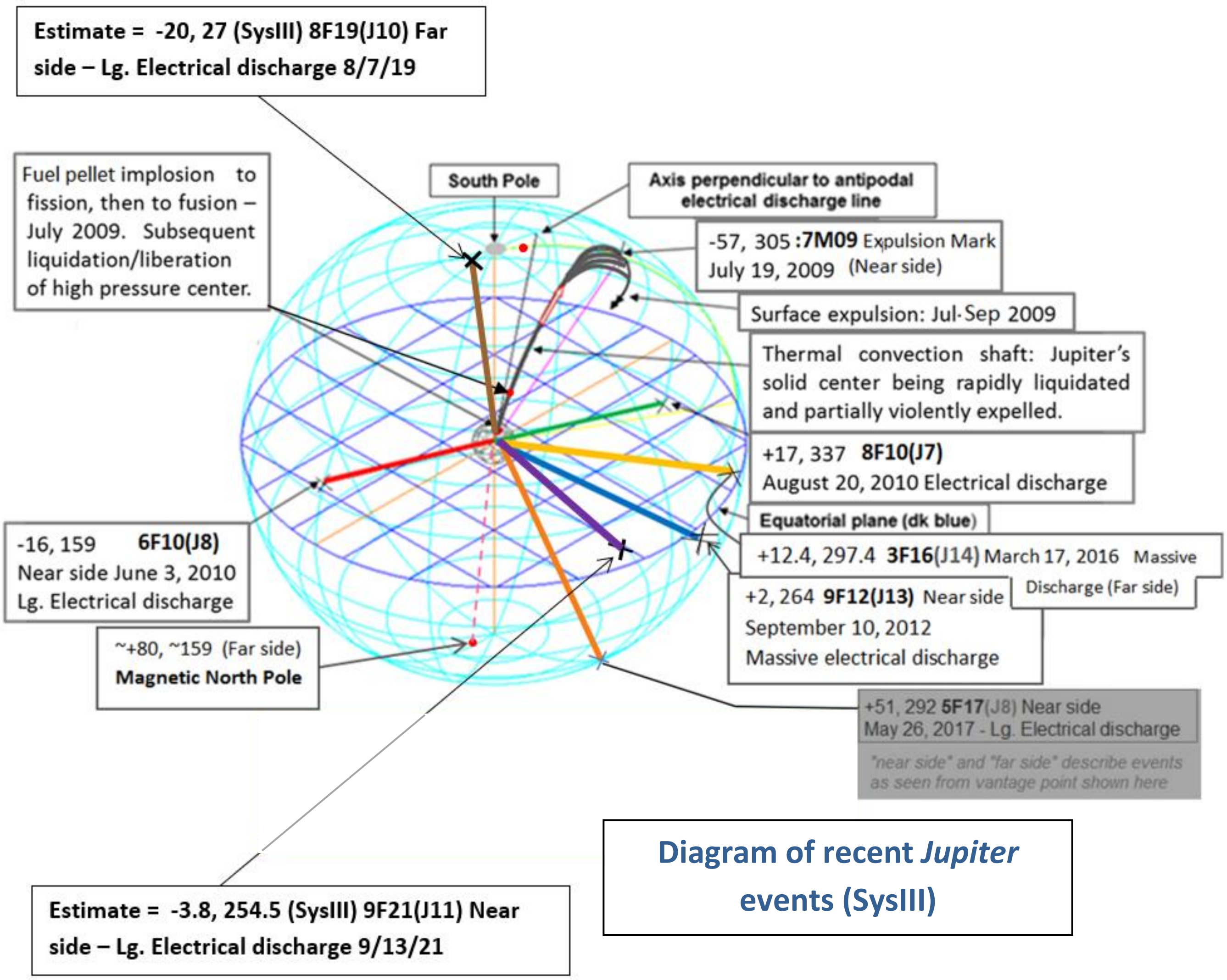


Figure 62 –Diagram of Jupiter Events Since 2009

Here are the events in order:
--1994 - Levi-Shoemaker 9 - a true comet impact
--July 19, 2009 - black mark said to be an asteroid, but like an expulsion mark
--June 3, 2010 - flash of light
--August 20, 2010 - flash of light directly on OPPOSITE SIDE of planet when shown with June 3 event. It was almost nearly antipodal, just a degree off.
--September 10, 2012 - flash of light
--March 17, 2016 - flash of light
--May 26, 2017 - flash of light
--August 7, 2019 – flash of light
--September 13, 2021 - flash of light

With all of the items above that say "flash of light" - NO DEBRIS WAS DETECTED, and NO INCOMING OBJECT either. Each item appeared as LIGHTNING and NOT an impact.

3rd CTS – *Cassini's* try at *Saturn*

As mentioned earlier, most of the information for the 2nd CTS applies here also. Rather than rehash it, please refer to the 2nd CTS for detail on how Saturn may be affected by the Cassini plunge. Additional details follow.

Saturn's **solid** core (20% of its diameter) is thought to be much larger than *Jupiter*'s and this is why we think the CTS method has its best shot there. Of course, the *Cassini* spacecraft plunged into *Saturn* September 15th of 2017. We estimate that since the variables are different (a bit slower fall due to less gravity, but less resistance helps speed it back up) we should **expect a similar 2009-type *Jupiter* mark to start to appear on *Saturn* sometime in mid-2023 plus or minus a year.** *Jupiter*'s was clocked at 5 years 10 months. The *Saturn* pellets' terminal velocity and fall dynamics should ultimately not be very different, the final effect being to allow a further penetration into *Saturn*.

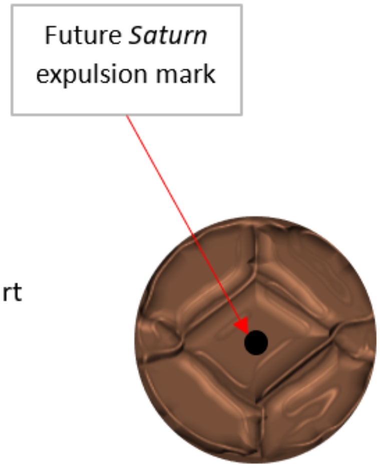
If it is true that the solid core of *Saturn* is relatively large as we have been told, we could see the very heavy center be expelled violently to the surface only to continually sink back down while dragging the very light surrounding original top surface down with it; if this is continued long enough it could cause the actual type of implosion that was seen in the "2010" movie, only this time happening on ***Saturn*** (interestingly, A.C. Clarke's original target was *Saturn* in the prequel novel, "2001" – it was said to have been changed to *Jupiter* for ease of movie special effect purposes).

https://www.youtube.com/watch?v=6EKreQ5HD4w

Above image: *Saturn* is at the beginning stages of getting turned "inside out". The black mark at its top left is the initial location of expelled matter from the center. After expulsion, the matter is still heavy and wants to sink back down while dragging the surrounding surface down with it; Note that *Saturn* appears to be "dented"; this is the effect that will demonstrate the gravity of the matter that is pulling *Saturn* to implosion. This continues and grows in a cascading reaction that collapses the planet, like we saw in the movie "2010". Once the collapse gets going, there will be no stopping it. The center is solid and large enough to continue the expulsion for months, relentlessly pulling the surface down during that time.

The trailing dotted pattern seen above is some expelled central matter that is being constantly pulled around a certain latitude of the planet due to its wind pattern in the upper atmosphere.

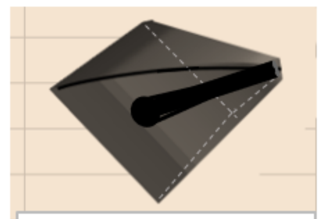
This is what we will likely see around 6 years from *Cassini's* entry into *Saturn*, or "around 2023-2024". Refer to "2nd CTS" evidence and information for details on how this is done; it is a similar situation to the *Jupiter* attempt. Also see the initial set of diagrams: ***The general sequence of a CTS (A through J)***.



RUDIMENTARY DISPLACEMENT CALCULATION:

If you divide *Saturn* into 12 equal wedges each with an equal part of the center then each is 8.33% of the planet's mass.

The solid center core of *Saturn* is 1/6 the mass of the planet to scientists' best estimates.



1 of 12 wedges

(Expulsion event within)

Remove the central core part from the wedges and each wedge is only 5/72 of the planet's mass.

Assume the entire center mass now displaces to one of these wedges: 12/72 + 5/72 = 17/72 = **23.6%** of the mass of *Saturn* now in one wedge.

This would also cause obvious gravitational and rotational displacement problems that would greatly affect the planet.

Saturn's center of gravity would be thrown off, weighted significantly off-center towards the expulsion event and *Saturn* would try to "equalize" this displacement by "pulling in" the displaced matter towards the new center of gravity. This could cause an unstoppable cascading collapse.

A change to *Saturn* that does not include fusion

Maybe gravity-induced fusion cannot occur inside *Saturn*; if so, such a cascading event still would alter the size and possibly rotation and orbit, and subsequently *Saturn*'s moons would be doing something different afterwards also. Consider the *Electric Cosmos Theory* where the "fusion star" idea is not actually supported anymore, where the universe is dictated by electricity and not gravity, and you might look at this entire scenario in a different way. Such a change to *Saturn* then would change its electric parameters and we would have to be experts on that theory to know what would happen. We are not going into that in this book although someone should, and we hope they do.

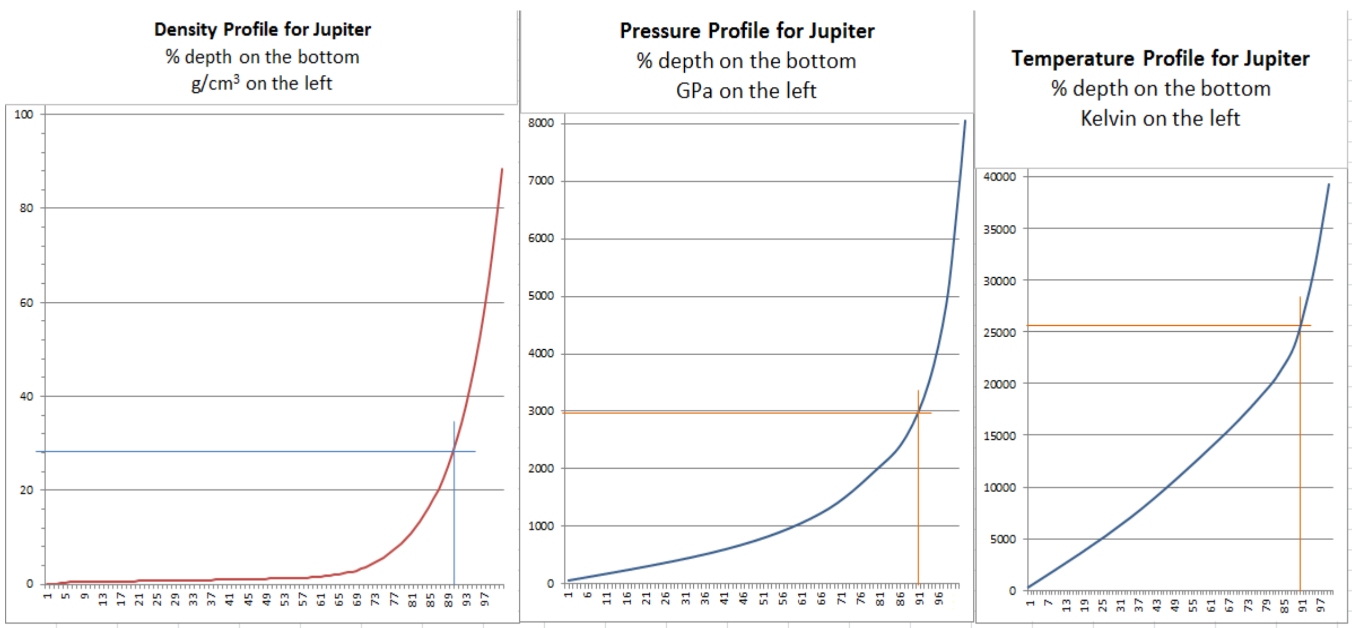
Conclusion

It seems sensible that we should inform readers to a real possibility of a "Wesley-mark"-type event on *Saturn* to occur in the 2022-to-2025-time range. Given the oddity of the *Jupiter* event in 2009, it only makes sense that what we have described will also happen to *Saturn* to some extent. With the added dynamics of *Saturn's* large solid core potential, the hypothetical possibility of *Saturn* collapsing on itself from the displacement of its center toward its surface does exist, and this could cause a violent ignition of *Saturn* into some sort of stellar or other strange celestial object. This potential event ranks high on the "alert" scale, even if the odds are deemed "low". Potentially, billions of new significant chunks and pieces might be thrown throughout the solar system if there is a "shock nova" from this event and such objects are able to reach escape velocity. Such an event would transform the solar system for a very long time; *Saturn* might even change its rotation and tilt, and/or be thrown off orbit, changing the planetary gravitational harmonics known to exist in the solar system. A *Saturn-Ops* celestial could also brighten Earth nights with a light five times that of the full moon for eons to come.

Appendix

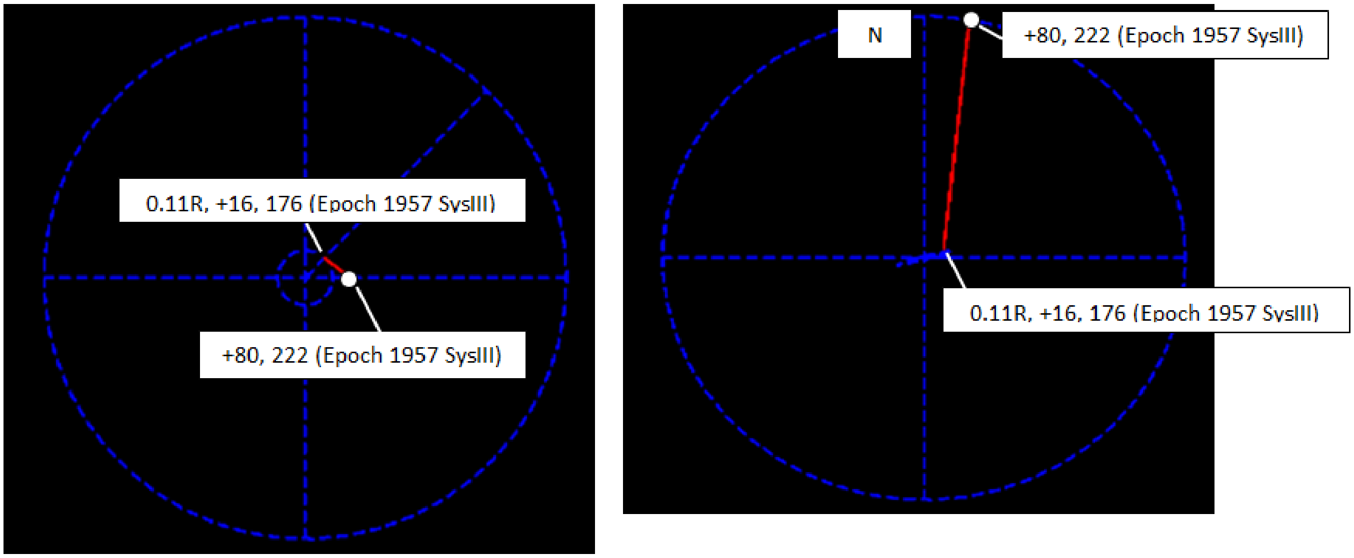
This multi-sectional appendix contains some general reference information, passages not considered vital to the concept of the book, and information that is more speculative and needs further research. Much of it comes from pieces of earlier editions of this work.

Appendix A – Estimated *Jupiter* Density, Pressure, and Temperature Profiles



Appendix B – Estimated Magnetic North Pole of *Jupiter*

Below are two maps showing the estimated magnetic north pole of *Jupiter*. The left is *north-pole centered* and the right has *north at the top*.



Magnetic North Pole - Jupiter

From *Pioneer* spacecraft data a preliminary scheme was established for *Jupiter*'s magnetic north pole (shown above with *Epoch 1957* coordinates). At the time the pole was oriented *from* +80, 222 SysIII *to* slightly off-center at 0.11R, +16, 176 SysIII. These are *Epoch 1957* coordinates, which are different from today's coordinate system for *Jupiter*. Later data is hard to come by but indicates the new lat/long for the north magnetic pole at ~+80, ~159 SysIII. [109]

Appendix C – Estimated Sun Internal Fusion Parameters

(Errata: 2nd line "Billions" should say "Millions")

Temp: Millions Kelvin	15.7	4.7
Pressure: Billions of bars	350	10
Density: grams per cubic cm	160	8
Fusion Power Density: watts/met^3	276.5	0.001
Elements	H (93+) & He	
Wattage produced	3.9E+26	
Surface area (m^2)	6.1E+18	
Surface Temp (K)	6000	

Gas Giant atmosphere references:

Jupiter pressure graph

[https://cronodon.com/images/*Jupiter*_graph1.jpg](https://cronodon.com/images/Jupiter_graph1.jpg)

Saturn atmosphere diagram #1

https://opentextbc.ca/astronomyopenstax/chapter/atmospheres-of-the-giant-planets/

Saturn atmosphere diagram #2

https://s3.amazonaws.com/thumbnails.illustrationsource.com/huge.101.507018.JPG

Appendix D – More Information Related to Radioisotope Fuel Pellets

TABLE 2-3. REPRESENTATIVE CHARACTERISTICS AND ISOTOPIC COMPOSITION OF CASSINI RTG FUEL

Fuel Component	Weight Percent at Launch	Half-Life (years)	Specific Activity (Bequerels/gram [curies/gram] of plutonium}	Total Bequerels (curies)/RTG[a] at Launch
Pu-236	0.0000010	2.851	2.0×10^{13} (531.3)	2.2×10^{9} (0.06)
Pu-238	70.810	87.75	6.3×10^{11} (17.12)	4.84×10^{15} (130,925.20)
Pu-239	12.859	24,131	2.3×10^{9} (0.0620)	3.2×10^{12} (86.11)
Pu-240	1.787	6,569	8.4×10^{9} (0.2267)	1.6×10^{12} (43.75)
Pu-241	0.168	14.4	3.8×10^{12} (103.0)	6.9×10^{13} (1,864.30)
Pu-242	0.111	375,800	1.5×10^{8} (0.00393)	1.8×10^{9} (0.05)
Other[b] Oxygen	2.413 11.852	NA[c]	NA	NA
Total	100.000	NA	NA	4.9×10^{15} (132,920)

Source: Fairchild Space 1993

a. Based on computation of isotopic composition by Fairchild Space for the launch date (October 1997). The radioisotopic fuel for each Cassini RTG is a mixture of plutonium dioxide (PuO_2) containing 70 percent (plus or minus 1 percent) Pu-238 and totaling 10.8 kg (23.8 lb). Three RTGs are planned for Cassini.

b. Small amounts of long-lived actinides and stable impurities.

c. Not applicable.

[138]

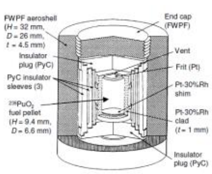


Figure 3. Current LWRHU (Johnson, 1997).

The actual fuel pellet in the LWRHU is 9.4mm long by 6.6mm Ø. [110]

In an accidental Earth re-entry the LWRHU was designed to survive such an event with the clad only reaching 1726 K after 270 seconds, well below the melting point of platinum-30 rhodium (2150 K melting point). Such a set-up makes it also likely that with the 103 LWRHU's going into *Jupiter* in 2003 (with no GAEP heatshield this time) and with more than this amount going into *Saturn* in 2017 with the *Cassini* plunge, some are/were sure to survive even a gas giant entry simply because of the random and chaotic factors where some will be more protected by chance than others behind various elements of the spacecraft during entry. More importantly *Cassini* will carry **216 G-R fuel pellets** into *Saturn* on the day of its plunge. [110]

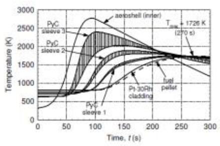
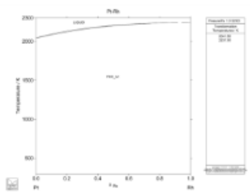


Figure 12b. Calculated temperatures in LWRHU during nominal operation and side-on re-entry heating pulse (-4.85° inertial angle).

> *"Plutonium dioxide is a stable ceramic material with an extremely low solubility in water and with a high melting point (2,390°C)."* [111]

Bare plutonium's melting point is 3200K at 140Mbar and 913 K at 1 bar.

Melting Point of Pt-30% Rh = approx. 2150 Kelvin



[112]

Iridium Notes:

Compression data for iridium:

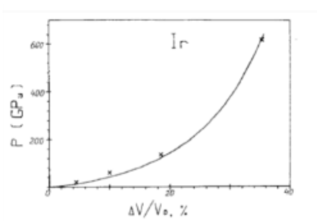


Fig. 4. Equation of state for iridium. Experimental data are from Ref. 11

[131]

> *"Solid iridium is fcc. Room temperature compression to 175 kbar showed no phase transition. Iridium melts at 2716 K. The melting curve has not been reported."* [132]

Iridium is used for "stress rupture" avoidance and high melting point. Dopants (DOP) are added to increase other factors such as ductility, hence *DOP-26 iridium.*

> *"The metal Ir has a unique combination of properties, including a high melting temperature, strength at high temperature, oxidation resistance and corrosion resistance, that are useful in a range of applications, particularly at elevated temperature."* [133]

> *"The DOP-26 iridium alloy, containing 2000- to 4000-ppm W, 30- to 90-ppm Th, and 20- to 80-ppm Al by weight, is used as a cladding material. The closure weld on the fueled clad is performed by gas-tungsten-arc (GTA) welding, which under certain conditions results in hot cracking of the fusion zone. .... The threshold stress for cracking of DOP-26 alloy increases by a factor*

of two as the thorium content is decreased from 94 to 37 ppm. There is no effect on threshold cracking stress for variations in oxygen content of the argon welding atmosphere from 10 to 2000 ppm or for variations in water vapor content from 10 to 1000 ppm." [134]

"The effects of Ce and Th doping (20–50 wppm) on the mechanical properties of Ir alloys were investigated. At both low ($\sim 10^{-3}$ s^{-1}) and high ($\sim 10^{3}$ s^{-1}) strain rates, the Ce+Th doped alloys undergo a transition from brittle intergranular (plus some transgranular) fracture at low temperature to ductile transgranular fracture at elevated temperature." [135]

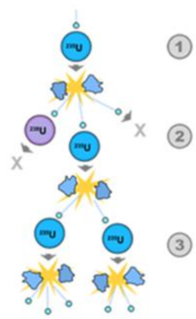
"DOP-26 Iridium Alloy (developed by ORNL)
By weight: 0.3% tungsten to enhance weldability; 60-ppm (parts per million) thorium to increase ductility 50-ppm aluminum; Unique properties High-melting point; Good high-temperature strength; Good oxidation resistance; Compatibility with the fuel and graphitic heat-source components; High impact ductility at high temperatures" [136]

More *Fractional Crit* information for plutonium:

"The critical mass of compressed fissile material decreases as the inverse square of the density achieved. Since critical mass decreases rapidly as density increases, the implosion technique can make do with substantially less nuclear material than the gun-assembly method. ***The "Fat Man" atomic bomb that destroyed Nagasaki in 1945 used 6.2 kilograms of plutonium and produced an explosive yield of 21-23 kilotons [a 1987 reassessment of the Japanese bombings placed the yield at 21 Kt]. Until January 1994, the Department of Energy (DOE) estimated that 8 kilograms would typically be needed to make a small nuclear weapon. Subsequently, however, DOE reduced the estimate of the amount of plutonium needed to 4 kilograms.*** *Some US scientists believe that 1 kilogram of plutonium will suffice."* (Bolding by JEC) [137]

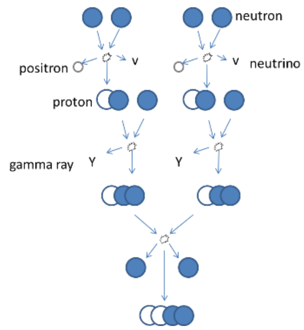
Appendix E – Typical Fission and Fusion Nuclear Reaction Diagrams

a. Typical Fission Reaction (this following diagram is for Uranium-235 fissioning)



"1. A uranium-235 atom absorbs a neutron and fissions into two new atoms (fission fragments), releasing three new neutrons and some binding energy.
2. One of those neutrons is absorbed by an atom of uranium-238 and does not continue the reaction. Another neutron is simply lost and does not collide with anything, also not continuing the reaction. However one neutron does collide with an atom of uranium-235, which then fissions and releases two neutrons and some binding energy.
3. Both of those neutrons collide with uranium-235 atoms, each of which fissions and releases between one and three neutrons, which can then continue the reaction." [113]

b. Typical Fusion Reaction: (P-P) Proposed Type of *Jupiter* Fusion



Proton-proton chain reaction is thought to be common in stars like the Sun.

1. Fusion of two H nuclei (which are protons) = deuterium
2. This releases a positron and neutrino; one proton becomes a neutron
3. Protons channel through Coulomb barrier (weak interactions dictate this)
4. Positron immediately annihilates with electron and this mass energy = carried away gamma ray photons.
5. Then the deuterium from the first stage fuses with another H to produce 3He.

Three paths are then possible to produce helium 4He. [114]

Appendix F – Greater Confinement Time Increases Heat to achieve Fusion Initiation from Fission

The time required for constraining the initial fission reaction in order to properly heat past the fusion mark is easily achieved in our scenario. As mentioned earlier, at Nagasaki's atom bomb detonation, the reaction was held for 1 millionth of a second (confined) with only an implosion device and then the outside 1 bar of normal Earth pressure, therefore having 10' of millions of bars pressure deep inside *Jupiter* after a successful implosion will allow our proposed fission reaction to be confined to a much larger extent and reach into the trillions Kelvin or more, overkill temps for starting a P-P hydrogen fusing chain reaction (1H+1H→Deuterium releasing a positron and neutrino as 1 proton changes to a neutron…etc.), (see **Appendix E**). [129]

As with fusion reactions in stars, we are told they are self-regulating, therefore we should apply the same reasoning here. This proposed fusion ball would expand no less and no more than the parameters and conditions dictate to support it. Too small and it would expand appropriately from excess heat; too large and fusion reactions become so weak as to reduce the size of the effective ball accordingly. Initial pressure relief occurs at a weak point to keep the planet from exploding; we likely saw this July 2009 on *Jupiter*.

Appendix G – *Jason Group* Information

The *JASON Group* that William Cooper fingers (see **Appendix H,** and the reference earlier with Richard Garwin being a member), is an "elite science minds" group much like a modern *but continuously existing* "Manhattan Project" research group made up of 30-60 people at any one time and funded by agencies like DARPA and the DOE, the perfect sort of clandestine group to choose members from to take on a mission such as the *Jovian Transformation* (referred to as "Project Lucifer" by many) since most of their project findings are "classified". Their existence and the basic details of their works are public, but most of their projects are kept secret. The group's name was supposedly taken from *Jason and the Argonauts* of Greek mythology.

To be sure, there is no doubt that the group exists as Ann Finkbeiner describes in her book, but their project subjects and findings are usually kept from the public. [115]

Appendix H – Supporting Accounts and other Information to Consider

Cooper's Account

Another account from a book published in 1991 has Milton William Cooper claiming he was privy to documentation for the project we are discussing dubbed "Project Lucifer" back in the early 1970's when working on the intelligence briefing team for the Commander of the Pacific Fleet.

> *"The spacecraft called Galileo is on its way to Jupiter, a baby star with a gaseous makeup exactly the same as our sun, with a load of 49.7 pounds of plutonium…..When its final orbit decays in December 1999, Galileo will deliver its payload into the center of Jupiter. The unbelievable pressure that will be encountered will cause a reaction exactly as occurs when an atomic bomb is exploded by an implosion detonator. The plutonium will explode in an atomic reaction, lighting the hydrogen and helium atmosphere of Jupiter and resulting in the birth of the star that has already been named LUCIFER. The world will interpret it as a sign of tremendous religious significance. It will fulfill prophecy. In reality it is only a demonstration of the insane application of technology by the JASON Society [JASON Group] which may or may not even work…."* [116]

William Cooper was only privy to partial details of this project. Regardless, his account is stunning.

Examining Cooper's account of the project details:

1) *"…a load of 49.7 pounds of plutonium…"* -- This accounts for the fact that not all of the plutonium was present in the G-R's only, this allows for the added LWRHU load plus some unknown extra amounts. (0.333x144=48, 0.006x120=.72, these added = 48.72. leaving about 1 lb. unaccounted for).

2) *"...final orbit decays in December 1999…"*-- This was the original end of mission time slated for *Galileo*; it was subsequently extended by 4 years, (however the *GAEP's mission* ended December 1995 delivering its underhanded plutonium payload into *Jupiter*).

3) *"…Galileo will deliver its payload into the center of Jupiter…"* – The most stunning of claims by Cooper regarding this matter, yet it is just becoming clear how the central area of *Jupiter* can be reached, like the "David and Goliath" story, the small fuel pellets can sneak through like a pebble into the brain of the titan.

4) "The unbelievable pressure that will be encountered will cause a reaction exactly as occurs when an atomic bomb is exploded by an implosion detonator." – This has been shown possible already, but only became public knowledge after Cooper suggested this as the plan.

Cooper also states here that the new star will be used as a *religious tool* (for a revived *Luciferian* world religion/philosophy).

For more on the *JASON Society* (actually *Group*) that Cooper mentions, see **Appendix G**.

Additional Supplementary Details to Consider

By 1994, it was calculated that in the recent millions of years *Jupiter* should only naturally receive a significant impact with a comet, asteroid, or meteorite once every 1000 years, but over the past 22+ years we have been told we have witnessed at least 6 impact events of such note. Rather than investigating the prospect that these events may not be impacts at all, or researching the possibility that something extraordinary is happening, astronomers have adjusted the odds of impacts occurring on *Jupiter* (and therefore all solar system bodies). That is the easy way out.

The odds of the SL-9 *obvious impact* event alone are realistically about once every 100,000 years assuming a 1-5 km comet on *Jupiter* (1-5 km when the 20+ pieces are put together as one piece). The odds of the latest five events over seven years (2009 to 2016), if they are indeed impacts, would also together *combine to be incredible odds.* This is why convention is desperately trying to reduce the size of the supposed flash impactors to 10-meter class, so that they can better justify the horrible odds of these "impacts". So we are truly talking some **remarkable odds** here for six significant impacts on *Jupiter* since 1994, especially when considering there have likely been many flashes we have not been able to even see.

It must be asked: Was SL-9 a contrived impact? Are the other events NOT impacts? These are valid questions given the incredible odds. The true odds barely favor one of the smaller events to be an impact and the other five to be contrived or something sourcing from within *Jupiter* that can be passed off as an impact. **If it can be shown that at least one supposed impact, *is actually plausibly man-induced*, then the odds for all others "impacts" to also be *contrived* (or induced by insertions) goes way up, even SL-9 as a possible "nudged to hit" impact.**

One report from the academic community in 1994 about the extreme rarity of a *Jupiter* hit when discussing SL-9 states:

> *"…The fragments would hit over a period of several days…on the night side of Jupiter. Unfortunately, this was the backside of Jupiter as viewed from Earth. The impact site would be…a few degrees beyond the dark limb as seen from Earth. The disruption of a comet into multiple fragments is an unusual event, the capture of a comet into an orbit about Jupiter is even more unusual, and the collision of a large comet with a planet is an extraordinary, millennial event [actually more than a millennial event, realistically]. The observatories of the world lined-up for a week of observations."* (Brackets by JEC) [117]

Subsequently, after so many other "impacts" began occurring most astronomers quickly jumped on the "*Jupiter* gets smacked all the time" bandwagon, obediently taking their cues from higher institutions.

Instead we propose it is likely that experiments are being conducted on *Jupiter* to get a better handle on its composition and/or structure or to attempt to ignite it into a strange small star for various reasons. Along this line, technology has progressed to the point that comets already on near-impact orbits could be very slightly *nudged* by special Earth spacecraft when in apogee to cause their next orbit to be a direct hit with *Jupiter*, as could have been the case with SL-9.

Consider this:

--The pre-history of Shoemaker-Levy 9 only goes back to March 15, 1993.
--Eugene Shoemaker, who was very interested in researching the pre-history of SL-9 (since he discovered it), perished in an incredibly odd one-on-one collision (another rare impact!) on the most remote road in the world (and a 37-foot wide road) in N. Australia in 1997, on July 18 (July 17 UTC), of all days, (another unlikely collision 3 years + just 9 hours after the first piece of the *rare* SL-9 collision with *Jupiter* named partly after Eugene).
--*Jupiter* comet orbits were considered extremely rare before SL-9 (so much more so for impacting ones!).
--*Galileo Spacecraft* was strangely in place to directly image the first known significant celestial body collision live (it had a direct line of sight).

Knowing these ***oddities*** above, one would have to admit the "strangeness" of the SL-9/Shoemaker happenings.

It is conceivable that other plutonium-laden craft have entered *Jupiter* without public knowledge, even to the extent of possibly the SL-9 comet being "seeded with plutonium fuel pellets" then "nudged" while in Sun-apogee (a Sun-orbiting comet or asteroid) into a later impact orbit with *Jupiter*. Or, simply as a cover for what planners knew would be considered suspicious (anomalous events on *Jupiter* after insertion of Pu), an "impact with *Jupiter*" was contrived to make impacts look more as "the norm". Yet again, it could well be a case of *"we need to have verification of the materials we are dealing with"*, and therefore getting a spectral analysis of *Jupiter*'s contents before plunging *Galileo* in would be prudent, hence a set-up with a slight *adjustment* of a body that is in apogee with its orbit around the Sun and which has nearly lost all momentum and is getting within the realm of a plausible *Jupiter* orbit at that point, therefore SL-9 fit the bill.

Yet another possible reason to secretly do a Jovian plutonium insertion experiment: By watching the timing of the reactions like the ones we have discussed here within, one could extract data about the profile of *Jupiter* at various depths. For instance: using Jovian density as the desired unknown variable plugged into *Stokes' Law*.

Author's Prediction from 2007

This author predicted in mid-2007 that the LWRHU's, of primary concern in this book, had great potential as they reached the central area of *Jupiter*. An article posted anonymously by this author on a popular blog, the article entitled "Analyzing what happened to the LWRHU's of *Galileo*", explains the situation and future potential:

> *"Much has been said about the larger plutonium-containing fuel cylinders on NASA's Galileo (and Cassini) mission, the main [G-R fuel pellets] inside the RTG's, but little has been said about the LWRHU's, ... It is interesting to study the path that these pieces take into the planets during a plunge also, because they are even more insulated and protected than the larger 1/3 pound cylinders. Also since they have a smaller weight they will take a significantly different path than the larger ones and therefore would not be expended in a critical blast from one of the main cylinders [and GAEP's 15 LWRHU's also not destroyed, of course]. If we assume that the O. Meeckers Jupiter mystery spot image from Oct. 19 was indeed the blast from a nuclear event of the larger cylinders going critical, then we must look at a situation where the smaller ones will go critical at a much later time and in a different area entirely. In addition to that fact, the smaller pellets, by the time they reach critical will be entirely dispersed from each other over 1000's of miles, so each one will have its own opportunity to fizzle… or go critical with a bang... Let's analyze a long-term journey of one of these eraser-sized pellets:*
>
> *There are 6 layers of protection tightly surrounding one of these pellets [as outlined earlier]…Assume many of the pellet pods (carbon and metals minus the heat shield, originally about 1" diameter by 1.3" length), survived entry and are still valid at [deep into] Jupiter where the pressures and temperatures are [very high].*
>
> *Portions of a Pu pellet surviving at any one of the depths listed above could arguably reach critical, even though very small in amount, simply because the pressures change the dynamics of what is critical mass at this depth. … Add to this the motion of the shifting heavy liquid gases of Jupiter and gravity downwards to the center, the result is a very slow continued fall for any intact portion…*
>
> *…it is tremendously difficult to estimate the time it would take for various small pieces of this conglomerate to reach critical levels deep within Jupiter. It was estimated that the larger cylinders reached a depth of only 700 miles before reaching critical and fissioning. The smaller units we are talking about start out 50 times less in Pu mass, and about 7 times less in mass when including the graphite and metal elements minus the heat shield of both types of cylinders. This means a slower fall for the small ones, and a much longer wait for critical. This may be the reason that NASA it still counting down the time from the Galileo plunge …as of today, 8/9/2007. One critical fission implosion ignition of a very small amount of plutonium very deep into Jupiter can create temperatures of several 100's of millions of degrees, overkill for fusion temperature thresholds. One relatively tiny superheat spark such as this could have tremendous significance in the bowels of Jupiter."* [119]

This prediction is important because even in 2007 this author was attempting to alert the public that other strange *Jupiter* events should be expected, and two years later, indeed, things began to get strange.

After further study it seems that the GPHS-RTG fuel pellets (rather than the LWRHU one's discussed above) are indeed a much better candidate for our theory if they can be shown to have survived much longer than originally assumed.

Electric Cosmos Connections

How can these events tie into the *Electric Cosmos Theory* (or *Electric Universe Theory*) which attributes most star characteristics to electrical phenomena? This "EC theory" makes good sense and does not discount what we are now proposing at *Jupiter*. *Jupiter* is actually showing signs of coming alive electrically (voltage discharges) and if one combines conventional theory with the *Electric Cosmos Hypothesis*, what we may be seeing is that internal fusion reactions increase the electrical driving potential of stars and forming stars. [120]

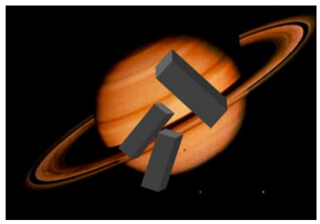
Another significant possibility for EC followers to consider is that something entirely novel is being produced here with such a Jovian transformation. If EC theory says "no star has a central fusion engine", then might *Jupiter* be the "first fusion engine in space”. If this is the case mankind has embarked on a strange adventure in which the outcome could be totally unpredictable since conventional theory could be totally unreliable for outcome prediction.

Another obvious point to consider: Has this *Jupiter* experiment indeed verified that *“Internal fusion cores can be created in celestial bodies.”* even though this one was obviously contrived? This would of course be the same as saying: *“chalk one up to the fusion star theory”* and *“we have shown how it is possible.”*

Ultimately, it is likely some kind of hybrid *Fusion/Electric Cosmos Star Theory* will be adapted by the mainstream.

Cassini* at *Saturn

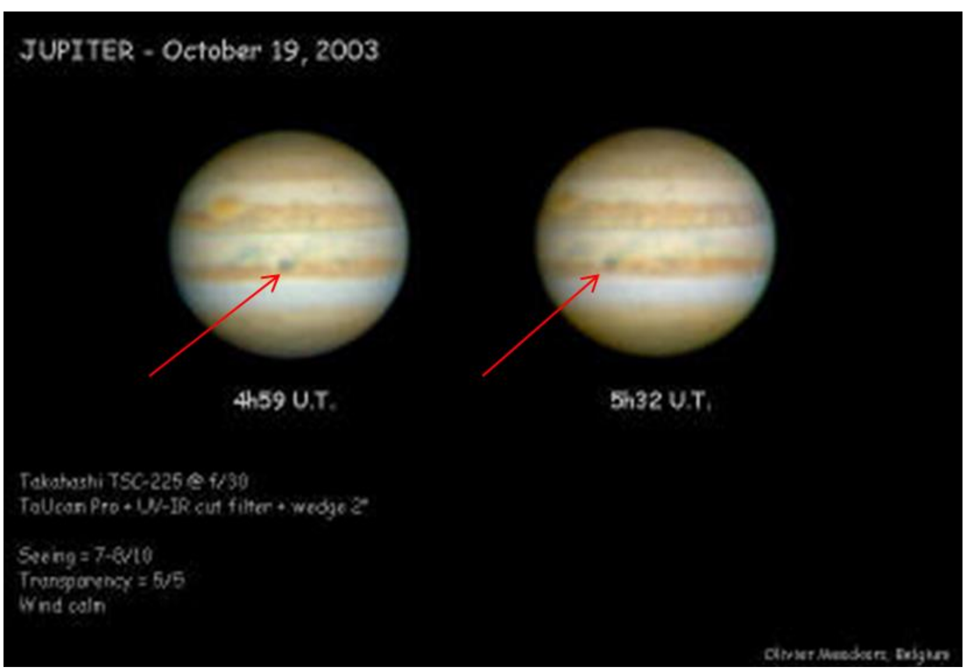
NASA plunged the *Cassini spacecraft* into *Saturn* on September 15, 2017. *Cassini* has the same RTG and LWRHU components that *Galileo* had (only more of each), and since *Saturn* is similar in make-up to *Jupiter*. Might we expect the same kind of “mysterious” happenings to follow on *Saturn*? [122]



Should We Expect a Repeat of Mark and Flash Events on Saturn Six years after the Cassini RTG’s Plunge?

Cassini carried 216 G-R fuel pellets into *Saturn* and also many LWRHU fuel pellets.

Appendix J – The *Jupiter* “Mystery Mark” of October 2003 Brief



***Jupiter, Dark Spot – October 19, 2003*, Credit: Olivier Meeckers, Belgium** [123]

Less than 28 days after the GSC entry into *Jupiter* on October 19, 2003, *Jupiter* was sporting a large black "mystery spot" the size of Earth (see above) near its equator. The entry point of GSC was approx. 0, 157 +/-5 (L3), and the mark was first imaged at 7, 12.7 (L3), a difference of 7 latitude and 144.3 longitude.

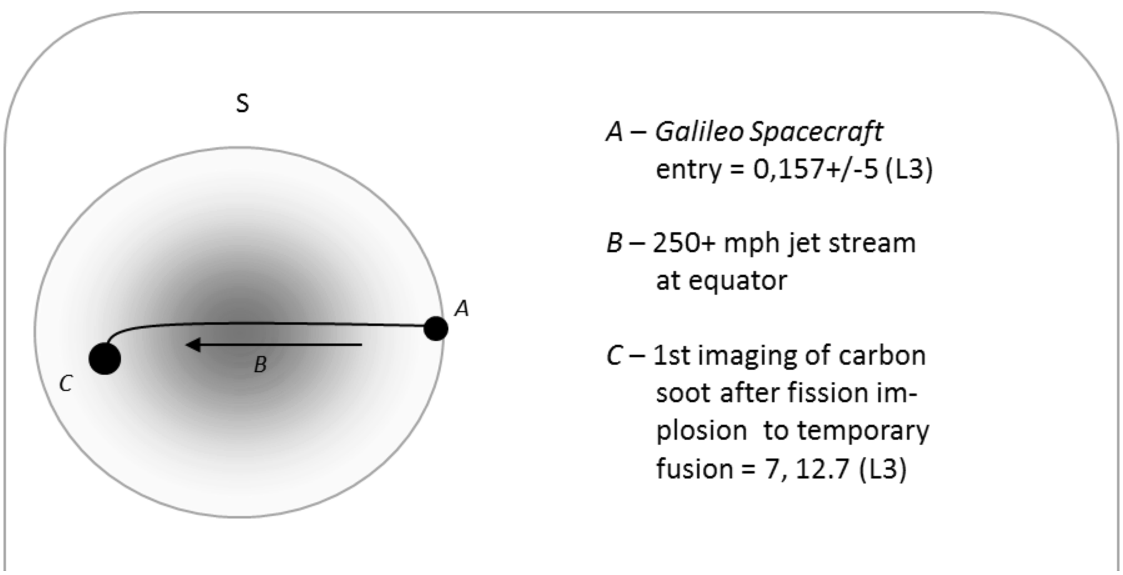
The GSC contained 144 GPHS-RTG Fuel Pellets each with a fissile Plutonium-238 dioxide mass of 1/3 pound, 72 of these being in each of 2 RTG's. Each fuel pellet was shielded by its main RTG casing in the General Purpose Heat Source Module as well as individually with many layers of protection, allowing survival of entry into *Jupiter*'s atmosphere. The GSC also contained 103 LWRHU's.

After calculating *Jupiter* atmospheric wind patterns over the 28 days from 09/21/03 to 10/19/03 it was determined that the location of the black mark *could* coincide with the source being a drifting of an object that entered *Jupiter* at the original *Galileo* plunge location, and the following drifting of an actual blast mark from a fission-fusion reaction (un-sustained) emanating from the craft's final drift location and caused by the natural implosion (due to *Jupiter* pressure) of one or more of the fissile plutonium devices aboard (see below).

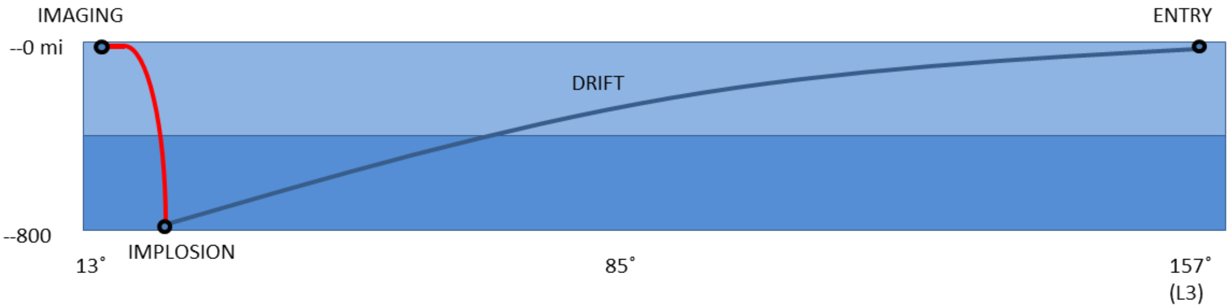
Addressing this "mystery mark" that occurred 28 days following the GSC plunge, there are of course a few possibilities: 1) it is as some suggest is possible, and the G-R fuel pellets went super causing the upwelling of mass and the mark, 2) the mark is a *Jupiter* anomaly unrelated to the GSC, 3) one pellet managed to meld with another (or others) causing Mc to be reached easier.

The latter "3" option is unlikely because of the sturdiness of the pellets. Any break that caused pellets to get together would also be likely to cause a complete destruction of the pellets before any critical mass could be achieved.

If indeed option number "1" is valid then we have evidence that the "factors other than just density increase" are greatly aiding the Mc achievement. This would mean that indeed the smaller LWHRU fuel pellets are still "in play" as the culprit.



Side view of possible drift in upper 1000 miles of *Jupiter*'s atmosphere (above)



Cross-section of possible drift (above)

<u>Notes for above figures:</u>
Entry location Galileo Spacecraft (w/48 lbs. Pu238/239, Pu-Dioxide mix in 1/3 lbs. pellets) and 103 LWRHU's.
September 21, 2003, 19:49 UTC: -0.25, 157 +/-5 (L3)
Proposed imaging of exit mark soot, October 19, 2003, 4:59 UTC: +7, 12.7 (L3), 121.3 (L2), 285.4 (L1)

The theory of the "mystery mark" being related to fissionable GSC elements generally conflicts with the main line of the our theory now because is it shown that likely not enough compression or density increase was available for the 151-gram G-R fuel pellets for them to individually implode to cause fission. However, if *other supercriticality factors* were enough to make up the difference, these fuel pellets would have been able to reach Mc earlier and this theory could still be valid. <u>If the latter is the case then the LWHRU fuel pellets are still a viable option for the much later events</u> such as **7M09** cause, etc.

Appendix K – *Lucifer* is the Projected Name for a Transformed Gas Giant

Arthur C. Clarke imagined a *Jupiter*-star in his book (and movie), "2010"; there was transformation over several days and then a full dramatic stellar ignition of *Jupiter* just in time to halt the nuclear powers on Earth from destroying the world. In the book, the star was named "Lucifer"; in the movie "2010" they did not have the nerve to mention this part.

> *"Fifty times more brilliant than the full moon, Lucifer had transformed the skies of Earth, virtually banishing night for months at a time. Despite its sinister connotations, the name was inevitable; and indeed "Light-bringer" had brought evil as well as good…"* [124]

Another account from a book published in 1991 has Milton William Cooper claiming he was privy to documentation for the project we are discussing dubbed "Project Lucifer" back in the early 1970's when working on the intelligence briefing team for the Commander of the Pacific Fleet (see **Appendix H**). He claims the *Jason Group* (see **Appendix G**) was responsible for the physics and engineering for such a project.

> *"… The plutonium will explode in an atomic reaction, lighting the hydrogen and helium atmosphere of Jupiter and resulting in the birth of the star that has already been named LUCIFER. The world will interpret it as a sign of tremendous religious significance …."* [116]

For many the name "Lucifer" has evil connotations. For some groups the *philosophical* concept of Luciferianism simply means "Humankind is striving and aspiring to be their own God, decide their own fate."

Clarke's *"Fifty time more brilliant than the full moon…"* for *Jupiter* would translate to 4 to 5 times more brilliant than the full moon on average for a similar calculation regarding *Saturn-Ops* as viewed from Earth. We have dubbed a new *Saturn* star "**Ops**" in reference to the wife of *Saturn* and a fertility deity (*Rhea* in Greek mythology).

Appendix L – Symbolic and Historic Timing of GSC Plunge

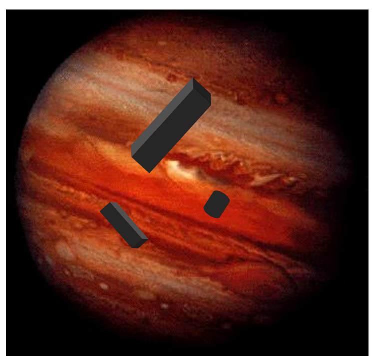
As just mentioned earlier appendices, both Arthur C. Clarke and M W Cooper had mentioned the general thought stream even back in the 70's was the novelty of turning *Jupiter* into a star, various intelligent forces inducing it to do so.

There is evidence to show that this artificial stellar attempt has been planned for some time and we have suggestions from at least two sources (A.C. Clarke and M.W. Cooper) that *Jupiter*'s new name, if successful in becoming some sort of stellar object, will be "Lucifer" or a derivative thereof, at least informally.

The *Jupiter*-altering efforts behind this possible project early on, dubbed "Project Lucifer" or "The Lucifer Project" by many, can be considered an act of tremendous harnessing of knowledge and energy to attempt an incredible solar system-changing feat, a "Great Work" to surpass that of the "Great Pyramids of Egypt"; a revelation of a "Philosopher's Stone" of tremendous power.

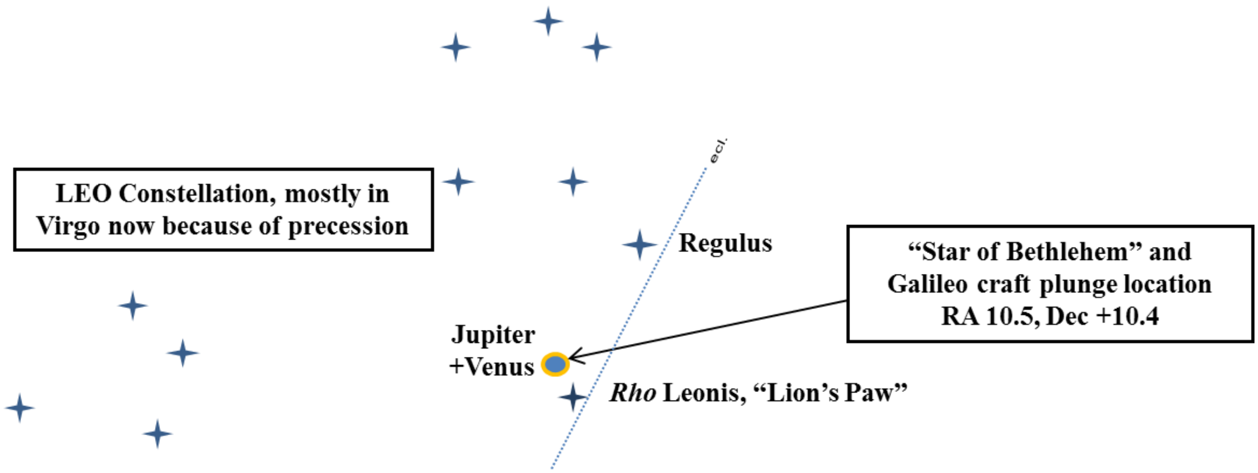
The transformation of *Jupiter* would be quite a feat, and it would alter solar system dynamics also. When A.C. Clarke wrote of man's transformation and *Jupiter*'s transformation in the books/movies "2001" and "2010" (*Jupiter* transformed in 2010 in the book, how close that year is to the "Wesley event" of July 19, 2009!), the black "monolith" was the mechanism of transformation to the "next level"; not only for *Jupiter*, but for humanity (*Bowman* was the representative of the transformed human). An RTG on GSC can be seen as a monolith of sorts, as a parallel concept; so could an LWRHU capsule.

In the "2010" storyline the monolith plunged into *Jupiter* and multiplied itself to cause *Jupiter* to change. In the real GSC Jovian plunge, multiple pellets of two different sizes were released into the depths.



It also turns out that there is a very curious sky alignment with the location of *Jupiter* where the spacecraft *Galileo* made its final plunge in 2003; it happens to be at the same location as another well-known "star"-making story, that is the "Star of Virgo", or better known as the "Star of Bethlehem" associated with the Christ story. This "star" was most likely the occurrence of the extremely rare **partial overlapping** of *Venus* in front of *Jupiter*, June 17, 2 BC, generally at *Right Ascension 10.5 hours*, *Declination 10.4 degrees* (see diagrams below).

This location is directly above *Rho Leo*, the "Paw of Leo the Lion". In freemasonry, the "Lion's Paw" has great significance as in the *Hiram Abif (sometimes spelled Abiff) story* where Solomon uses the "grip of the lion's paw" to resurrect Hiram from the dead. This story is used in the initiation of high level Masons as an illustration of "death of the old person, and birth of the new person" (another transformation parallel). M W Cooper's book *"Behold a Pale Horse", pg. 73-74 & 77,* also points out the symbolic nature of the *Lion's Paw* in freemasonry and the story off Hiram. [126]



Above, Co-Incidence of Two Events: Likely "Star of Bethlehem" and Possible "Star of Lucifer" Plunge Attempt

Another incredible coincidence! …

Or has there been a *Galileo* star-making adventure planned here, attempting to signify a new age with a new star symbolically replacing the *Star of Bethlehem?* And by using the names of *Galileo* and *Lucifer,* is this an attempt to signify the "quest for knowledge, glory, and the domination of space", despite the "church" or "others" attempts to quash this knowledge, recalling the stories of "*Galileo, the defiant astronomer*", and "*Lucifer, the rebellious angel*"?

Has the new and strange "Star Of Lucifer" been created? …The new *SOL*. Below is a more detailed diagram of the correlation of the GSC plunge with respect to the extremely rare partial overlapping of Venus on *Jupiter* in 2 BC. According to the *"Starry Night"* astronomy calculations, the overlapping occurred if viewing from farther south (southern Africa) and the extreme near conjunction occurred if viewing from further north (Middle East), above the horizon and after sunset.

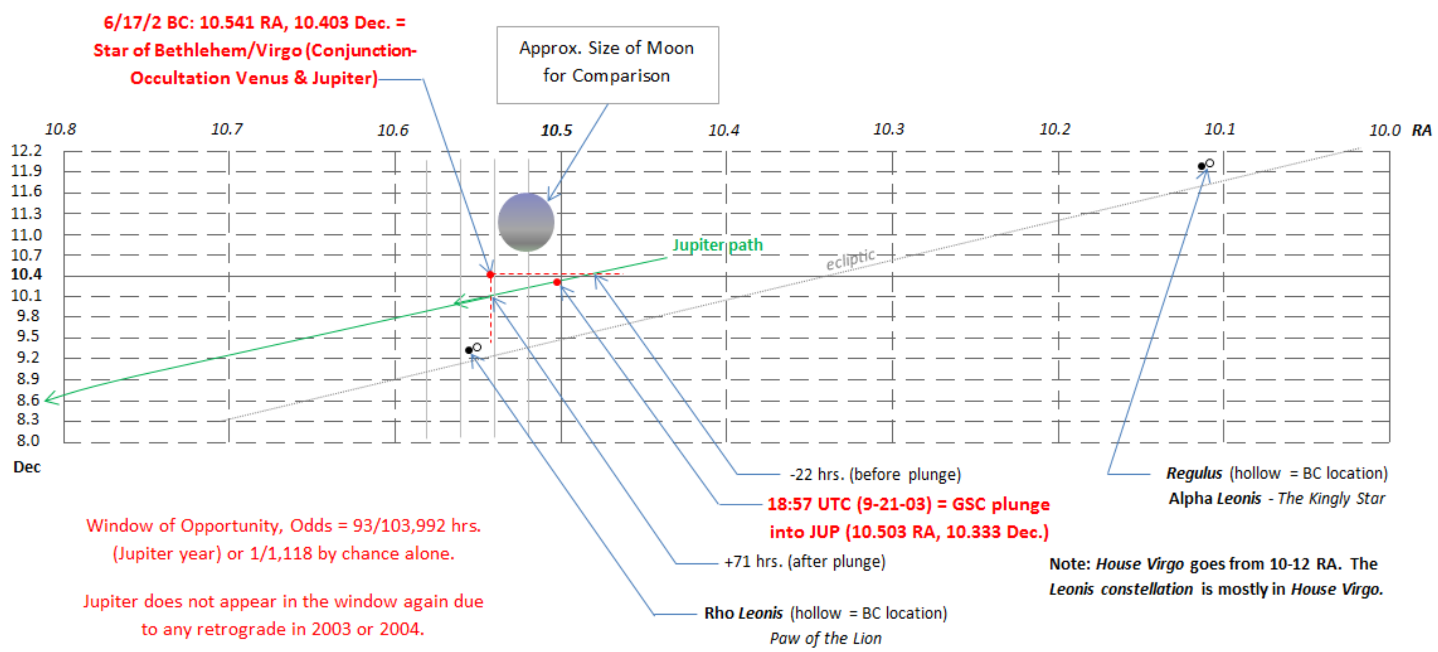


Chart Details of *Star of Bethlehem*
Coincidence with *GSC Jupiter Plunge*

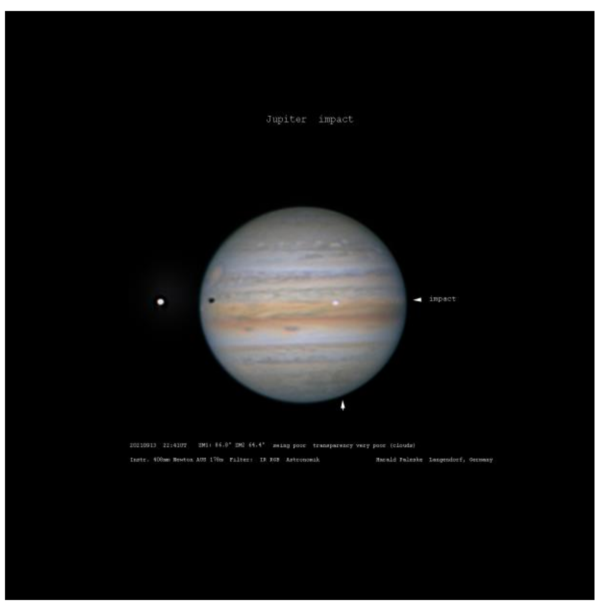
General Estimated Viewing Zones -- June 17, 2BC Occultation/Conjunction Event

Venus in front of Jupiter ("Starry Night" Astronomy Program Data)

Appendix M – Details of the latest Jupiter flash event

https://earthsky.org/space/impact-on-*Jupiter*-september-13-2021/

https://spaceweathergallery.com/full_image.php?image_name=Harald-Paleske-Jup2021_09_13_224309irgb_1631645295.jpg



Jose Luis Pereira (Brazil) New one September 13, 2021 22:39:30 UTC just south of equator & somewhat west of GRS (256.6 = CM at this time in Sys III) - GRS was 1 hour +37 minutes past CM.

https://www.alpo-astronomy.org/gallery3/index.php/*Jupiter*-Images-and-Observations/Apparition-2021/2021-09-13-2239-MrcDlcrx-WL

http://www.acquerra.com.au/astro/software/*Jupiter*.html

https://arksky.org/JupCMCalc.html

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