A monthly publication of the Clear Lake Gem & Mineral Society

STONEY STATEMENTS

A monthly publication of the Clear Lake Gem & Mineral Society

VOLUME 50 | February 2024 | NUMBER 2

NEXT MEETING: **Tuesday, Feb 20, 2024**

TIME: **7:00 p.m.**

LOCATION: Helen Hall Library
100 W Walker St.
League City, TX 77573

INSIDE THIS ISSUE

February Monthly Meeting

The February meeting is Tuesday, Feb 20, 2024 at the League City library. The annual rock show is 4 days after the meeting. We will be discussing final details regarding the show.

Show volunteers are listed here:
https://www.mflan.com/temp/clgmsjobs.htm
If you can fill any holes please contact Mike F. at mflan@mflan.com

Thank you to all show volunteers.

MINUTES OF THE January CLGMS GENERAL MEETING

Thank you to all members that attended tonight's meeting (1/16/2024), braving the very cold weather.

Monica Duran is now the official club's treasurer. Currently, Morgan Davies is still on the club's account until the final transition, maybe after our 2024 Annual show.

Jim Edwards has retired as the club's Board members, thank you Jim. We are electing Jeff Mills as the new Board members. Thank you Jeff for stepping up.
Jeff has many years of experiences from his previous club. I believe, he will help our club moving forward with his ideas and experiences.

U-Haul truck will be reserved one week before the show.

The club ordered 2500 ballpoint pens with the club's logo. These pens will be used during the show where attendees can fill out their information on the tickets.

The club has donated ($500) to Milstead Middle School for their earth-science project. Thank you, Mrs. Edith Sanchez.

Currently, we have 45 vendors on the list for the 2024 Annual show.

We still need volunteers for the loading/unloading (Thursday and Sunday) and set-up on Friday.

We also need some volunteers to fill a few opening slots at Hands-on and the Gem Mine.

David Tjiok

MINUTES OF THE February CLGMS BOARD MEETING.

There was no February board meeting.

Dealer tables at the 3/18/2023 rock show.

The Waterville Meteorite
of Douglas County, Washington
A New History of an Iron Meteorite Impact

By Delbert S. Duncan
d3co@comcast.net

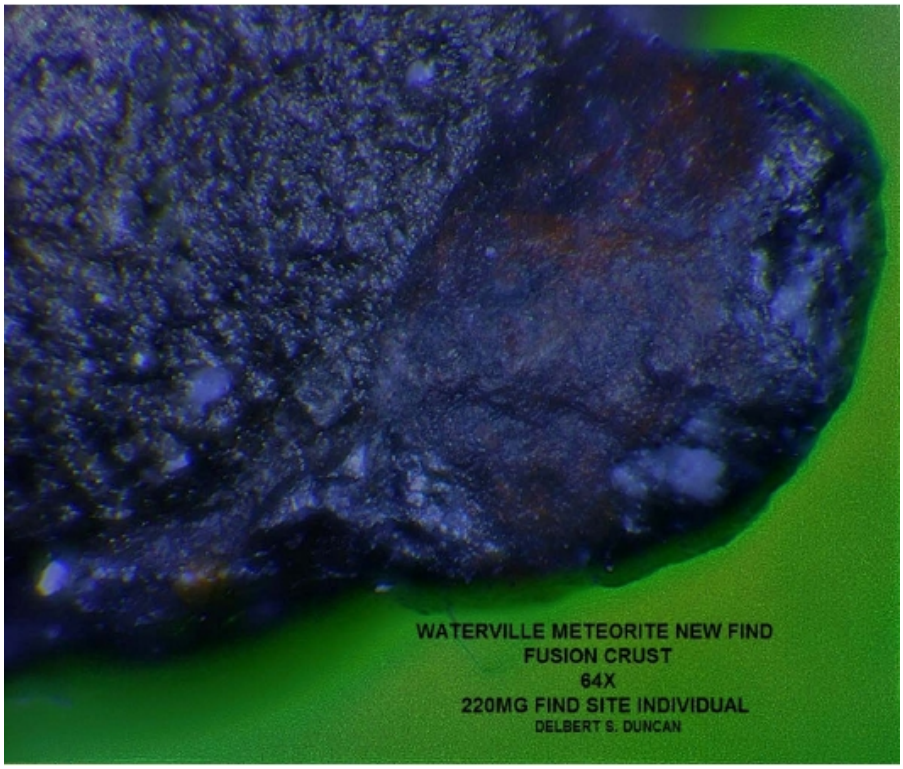
Introduction:

Meteorites contain a great deal of information that can be a source of historical facts that reveal how a meteorite fragment was created. The Waterville meteorite was found in a farm field in 1917.

There was no apparent crater in the area of the find, and the meteorite had little visible fusion crust. These findings indicate that the meteorite impacted at low velocity, and at a shallow angle. There were additional meteorite fragments found near the site of the original find in 1917, but these pieces have been lost over time. There were also additional microscopic pieces found during our search of the find site in 2012. These findings indicate that a strewnfield could exist for this meteorite.

The investigation and research on the Waterville meteorite that was accomplished in 2012 indicated that there was a strong possibility that the main mass of the Waterville meteorite may have been found near the edge of this strewnfield. This treatise will show that the Waterville meteorite may have impacted earth twice.

Investigation:



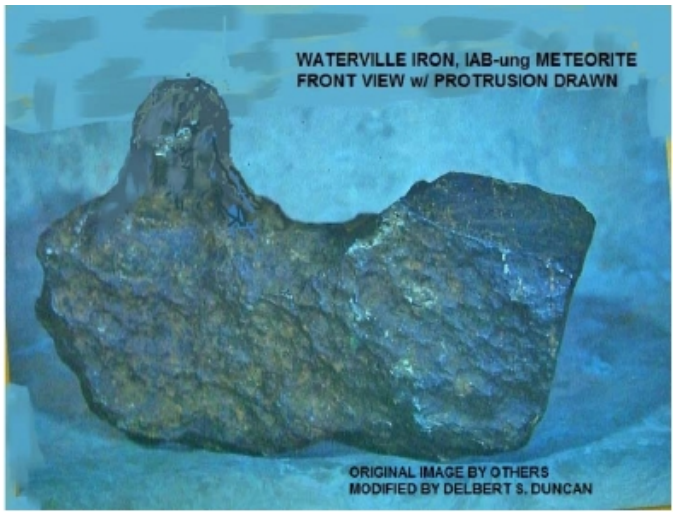
The Waterville meteorite has had very limited research accomplished on it, or how it came to be in Fred Fachnie's farm field. It is not even possible to determine what the original meteorite looked like, as there are no known photographs of this meteorite before pieces were cut and removed.

In 1918 William Schuenz, owner of the Waterville hardware store had the meteorite on display at his store. He suspected that this strange rock was a meteorite, but he was not sure. He decided to cut a piece from the meteorite, and send it to Salt Lake University for analysis. When the analysis came back it was confirmed that this strange rock was an iron meteorite.

The image below shows the back side of the Waterville meteorite, and where the protrusion was cut off. This piece has never been recovered, nor is there any record of the analysis that may have been preformed. It was said that William Schuenz used seven hacksaw blades making this cut, and this was the first piece cut from this meteorite.

It is difficult to determine what the original main mass of this meteorite may have looked like, but a deep groove, or depression, runs from front to back and is clearly visible. This material appears to be melted out, and probably formed the protrusion that was cut off. The smallest diameter of this meteorite was originally described as being nine inches in circumference, which would be this protrusion. The protrusion may have been about six inches long, as this length would allow the meteorite to be almost ten inches high, and would have been the right height to hit the sickle bar of the combine causing the combine damage, and creating the meteorite find.

The edges of this meteorite have been cut and removed from several of the sides, so one cannot determine exactly how they looked, but it would reduce the blockish shape if the edges were extended, and thin. A careful study of the geometric shape of the Waterville meteorite revels that this meteorite may have impacted earth, and been blown downrange by the explosion, and impacted a second time in Fred Fachnie's farm field. An impact such as this may have caused a meteorite impact crater to have been formed.

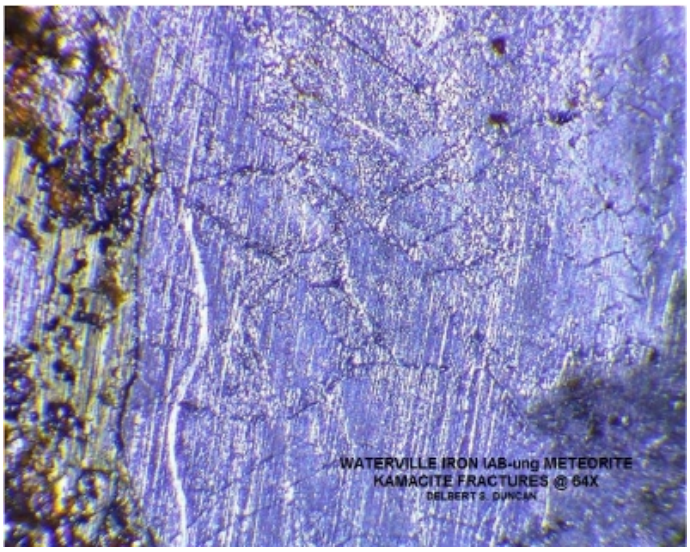


When an iron meteorite impacts, and forms a crater, the sudden energy release is often a massive explosion. The main mass of the meteorite is ripped apart, and fragments, called shrapnel, are thrown downrange. These fragments take on a very distinctive shape due to the intense heat (20000 C.) caused by an impact pressure of 60GPa, or more. The above left image shows two known shrapnel fragments from cratering meteorites. The first is the Whitecourt meteorite from Alberta, Canada. The second sample meteorite is a Sikhote Alin shrapnel fragment from Russia.

The above right image is of the Waterville meteorite with a protrusion drawn in where the piece was cut off by William Schuenz. This view is the front of the Waterville meteorite. A careful review of these images will reveal that in each case there is a deep channel depression across the meteorite from front to

back, and each has a trailing tail protrusion formed. In the case of the Waterville meteorite this protrusion has been drawn in. The distinctive geometric shape of the Waterville meteorite is almost identical to the two known shrapnel fragments, and gives an indication that the Waterville meteorite is a shrapnel fragment.

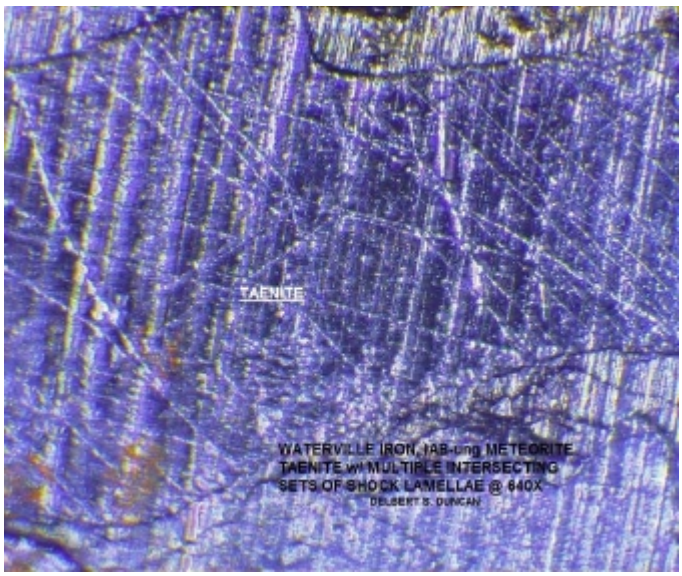
Shrapnel fragments are torn from the main mass meteorite during a violent cratering impact explosion. If the Waterville meteorite is, in fact, a shrapnel fragment then it must have come from such an event. This kind of event can cause a great deal of heat, and pressure which may cause shock metamorphism and deformation within the meteorite.



A paper by R.R. Jaeger, and M.E. Lipschutz, Department of Chemistry, Purdue University, titled: Pressure History of Some Iron Meteorites (1967) investigated the shock metamorphism that took place in three samples of the Odessa meteorite during laboratory controlled experiments that subjected the meteorite samples to three different intense pressures. The pressures were 13 GPa, 20 GPa, and 60 GPa, and in each case the sample showed distinctive metamorphism for that pressure. Evidence of shock metamorphism found within a meteorite sample will show that the sample went through a given pressure, but not when that event took place, but only that it occurred sometime in its passed. This kind of event causes a great deal of heat, and pressure which should be reflected in the Waterville meteorite samples that I have in my collection.

The image above shows a photomicrograph of kamacite @ 64x that is within the sample of the Waterville meteorite. The kamacite has been fractured by high pressure, at some point in time in its passed. This may, or may not, have been the impact event with earth. The kamacite fractured while it was brittle, and before it had a chance to become soft from the heat generated by the impact.

The photomicrograph to the right is an image of taenite from the Waterville meteorite sample that shows signs of shock lamellae caused by high pressure. Taenite has a great deal more nickel in the iron, and is much harder than kamacite. Shock lamellae and fracturing does occur in iron meteorites when the pressure is great enough.



The photomicrograph below shows a sample of the Odessa iron meteorite that has been shocked to 60 GPa (8,702,250 p.s.i.) pressure in the lab. Note that the taenite and kamacite show the same shock evidence that the Waterville meteorite samples have. In the experiment with the Odessa iron meteorite, as hereinbefore outlined, the meteorite samples shocked to 60 GPa pressure had fracturing of the kamacite, and shock lamellae in the taenite just as the Waterville meteorite samples show.

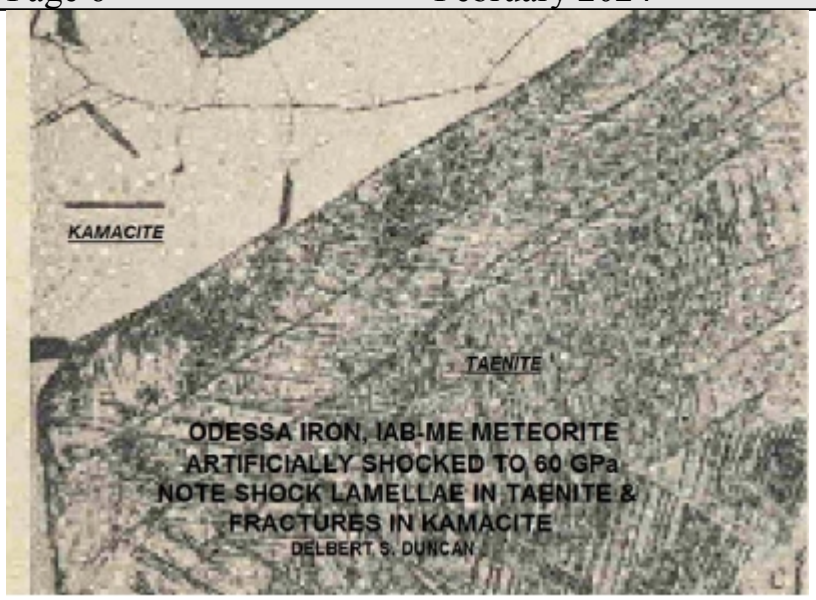
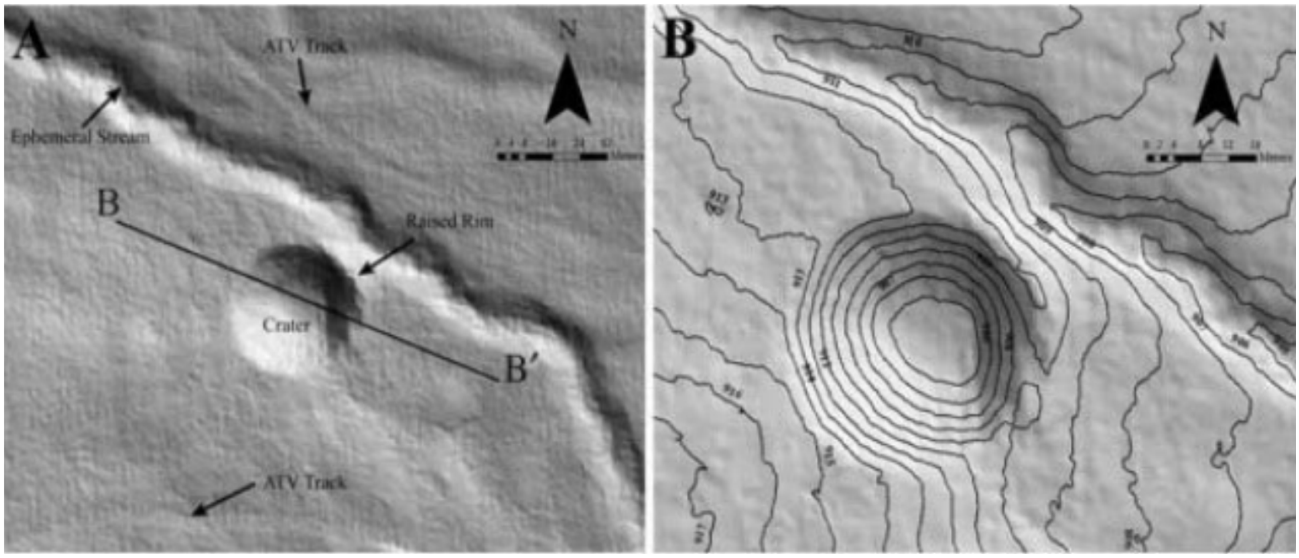


Table 1 provides some typical pressure ranges that occur for specific events that can happen during a meteorite impact event. A review of this table reveals that the evidence for a pressure of 60 GPa in the Waterville meteorite samples would cause all of the events through Rock Melts to occur, if this happened on earth impact. It is sometimes a valuable tool to simply estimate a series of events that could explain a scientific problem, and then work to prove, or disprove, the hypotheses. One must always keep an open mind when addressing a problem in this manner. Our goal in this case is to show that the Waterville meteorite impacted earth twice, once at the impact crater, and again at the find site. We will also try to prove that the Waterville meteorite is a shrapnel fragment from the main mass. I think that the Waterville meteorite made earth impact sometime between 800 to 2000 years ago. There is no evidence at this time to prove that fact.

The above image is the topographic survey of Whitecourt meteorite crater located in Alberta, Canada. This crater was discovered, and identified in 2007, and has since been studied a great deal. The University of Alberta has performed excellent research on this impact crater, and this data is a valuable tool when examining a small meteorite impact crater.

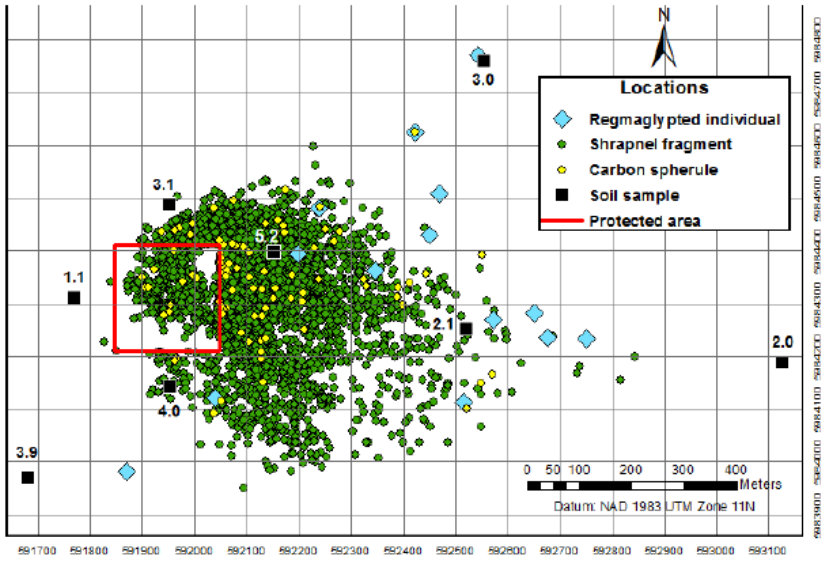


The above images show the geometric configuration of the Whitecourt meteorite impact crater. The impactor came in from the West at about ninety degrees to the short steep slope that is on the East side of the crater. This impact event has been dated at 1,100 years ago.

The impact occurred in a wooded area that is still in its natural state. The native material in the impact area is wet unconsolidated sand to a great depth. There is almost no rim around the crater, except for a small area near the steep slope on the easterly side of the crater. The crater rim has been removed by natural erosion. The debris from this impact went easterly out to about 1000 meters.

The image below, and left, is a plot of the meteorite finds in the strewnfield. There have been about 4,000 fragments found in this strewnfield. The university has located each find using the GPS, and has a

record of each find. The viewer should note that the North arrow is "Up" on this image, so this image is reversed from the crater image above. The crater in this image is within the red rectangle shown on the left. This rectangle marks the reserve area where meteorite hunting is not allowed.

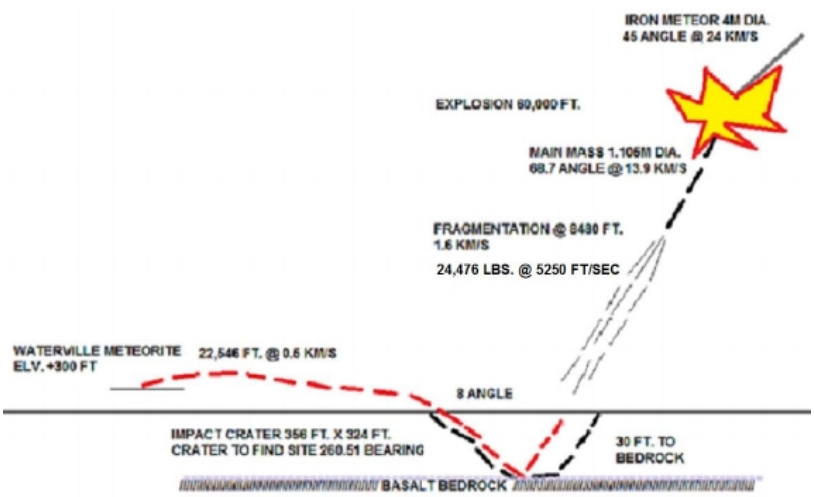


Hole Number 1 is located in Douglas County, Washington. This depression is not deep, but it has a remarkably similar geometric configuration to the Whitecourt meteorite impact crater. This depression scales at 356 feet x 324 feet, which is somewhat larger than the Whitecourt crater. The impactor direction shown in the above image is ninety degrees to the short steep side of the hole, and is in direct alignment with the find site of the Waterville meteorite. The projected strewnfield for an impact at this site is shown in white in the above image.

The existing geology at this location is a loose unconsolidated overburden to a depth of about thirty feet over dense Columbia flood basalt that is from 1,500 feet to 2,000 feet thick. The most important

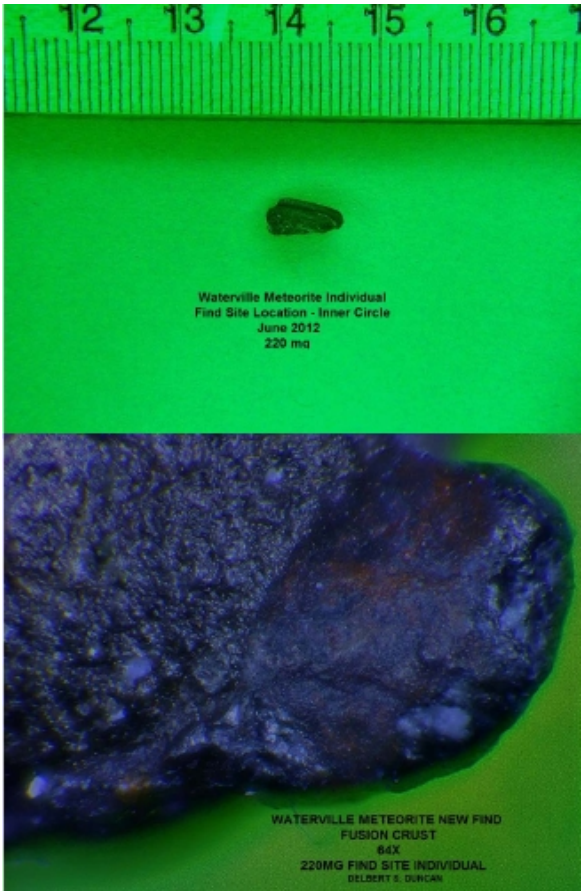
question that now comes to mind is if this hole can be connected to the find site of the Waterville meteorite. This would mean that there exists a set circumstances where an impact at this hole location could deliver the Waterville meteorite to the find site. It is understood that whatever parameters are employed to achieve this goal will not necessarily represent the actual impact event, but should be a reasonable approximation of this event.

It should be pointed out at this time that this site is on private land, and permission must be obtained to search for meteorite debris. All meteorites found at this site are legally owned by the landowner. It should also be remembered to respect the landowner's property.



The image to the right is a graphic representation of a meteoroid impacting earth. The above model shows that it is possible for fragments from the meteorite to have impacted earth at the hole site, and reached the find site of the Waterville meteorite. The numbers in the calculation show that shrapnel fragments could have reached the find site by impacting the basalt bedrock, and traveling downrange 22,546 feet to the find site. The unconsolidated loose overburden would be blown away by the compressed atmosphere before the cloud of fragments of the main mass impacted, and the fragments would have impacted directly off of the bedrock. This explosive impact off of the bedrock would allow shrapnel to form, and would increase the size of the strewnfield. The crater is larger than the Whitecourt meteorite impact crater because the main mass fragmentation impacted earth as a cloud of heavy iron pieces probably in the form of an elliptical pattern about 30 feet x 40 feet.

The difficulty of establishing a depression in the ground as an impact crater is well documented in a paper titled: "Impact Criteria for the Chiemgau Impact Event and Meteorite Crater Strewn Field". The following nine elements of acceptable evidence to establish a crater as having been formed from a meteorite impact event were taken from the above paper, and they are:



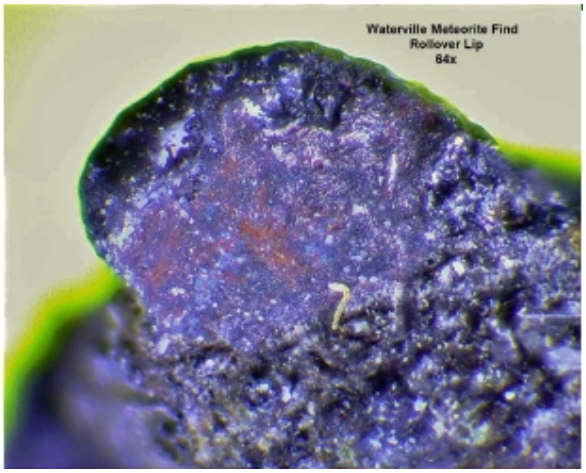
1. Morphology: Circular structures in general, depressions with raised rims.

2. Geophysical anomalies: Many impact structures are closely related with characteristic gravity and magnetic anomalies, but measured anomalies, in general, will not allow deducing an impact event.

3. Geologic evidence: Regularly found in, and around impact structures: deformations, folding, faulting, fracturing, polymictic and monomictic breccias, megabreccias, high pressure / short-term deformations of clasts in soft matrix, rocks looking like volcanic, or magmatic rocks, and layers of exotic material.

4. High-temperature evidence: Melt rocks, natural glass, breccias with melt rock fragments, and glasses.

5. High pressure evidence – shock metamorphism: Planar deformation features (PDF's) in quartz, feldspar, and other minerals; planar fractures (PF's) in quartz, diaplectic quartz and feldspar crystals, diaplectic glass; multiple sets of intense kink banding in mica; multiple sets of microtwinning in calcite. Kink banding in mica, and PF's in quartz are also known from very strong tectonic deformation.



6. Shatter cones: Shatter cones are characteristic shock induced conical fracture planes in all types of hard rocks. Shatter cone fracture planes show typical "horse-tail" fracture markings.

7. Special evidence: Occurrence of micro, and/or nano-diamonds, accretionary lapilli, and various kinds of spherules – spherules may be anthropogenic.

8. Meteorite fragments: In larger meteorite impact craters, in most cases, fragments are completely absent because of vaporization of the projectile upon impact. Microscopic geochemical signature of the impactor is possible. Meteorite fragments are, in general, found in and around young small craters. In the Macha meteorite crater strewnfield (Yacutia), however, the largest particles found that are assumed to be meteoritic are 1.2 mm in size.

9. Direct observation: Apart from the observation of meteorite showers (e.g. Sikhote Alin) impacts to have formed a meteorite crater have not been passed on.

According to current understanding points: 5. Shock metamorphism; 6. Shatter cones; 8. Meteorite fragments; and 9. Direct observation are each one by itself accepted as confirmation that a hole, or depression in the ground, is the result of a meteorite impact event.

In June of 2012 we discovered a small fragment of the Waterville meteorite at the find site. This particle gives every indication of having been derived from a high altitude explosion of a meteoroid in the atmosphere. This meteorite fragment is not large (220mg), but it has both a fusion crust, and a rollover lip which are clearly shown in the photomicrographs above.

An explosion of a meteoroid at 60,000 feet, as hereinbefore modeled, could produce small meteorite fragments that would have these same characteristics as is shown in the photomicrographs.

EVENT	GPa PRESSURE RANGE
(1) Quartz into Coesite	3.5 to 4.5
(2) Graphite into Diamond	2 to 10
(3) Shatter Cones Form	2 to 20
(4) Coesite into Stishovite	10 to 11
(5) Planar Deformation Features PDFs	10 to 40
(6) Diaplectic Glasses Form	40 to 50
(7) Rock Melts	60 to 100
(8) Vaporization	100 PLUS

Table 1

Conclusion:

This depression in the ground located in Douglas County, Washington has been reviewed within this treatise, but IS NOT PROVEN TO HAVE BEEN CAUSED BY AN IMPACTING IRON METEORITE. The required proof will require a great deal of field investigation with "Boots in the dirt". There have been only 12 impact craters found in the world that were caused by iron meteorites.

SCFMS and MEMBER CLUB GEM SHOWS			
	Feb. 24-25, 2024 **Clear Lake Gem and Mineral Society.** **Pasadena Convention Center** **Pasadena, TX** **http://www.clgms.org**	**March 10-12, 2024** **Houston Gem, Mineral, Jewelry & Fossil Show** **Humble Civic Center** http://www.hgms.org	**March 21- 23, 2024** **Gem and Mineral Society of Louisiana Rock Show** **Alario Center** **2000 Segnette Blvd.** **Westwego, LA 70094.** **www.gmsofla.org**
	April 6-7, 2024 **Lincoln NE Rock Show** **Ag Society Hall; 84th and Havelock, Lincoln, NE** **https://www.lincolngemmineralclub.org/**	**May 18-19, 2024** **Wisconsin Geological Society (WGS).** **Waukesha County Expo Building.** **https://www.wigeo.org/**	**June 17-18 – Arlington G&MS** **Grapevine Convention Center, 1209 S Main St, Grapevine, TX 76051;** **https://www.therockninja.com/event-details/arlington-gem-mineral-show**
STONEY STATEMENTS Clear Lake Gem and Mineral Society, Inc PO BOX 891533 Houston, Texas 77289			
Meeting 3rd Tuesday of the Month **7:00 P.M.** League City Library 100 W Walker St, League City, Tx 77573			
			

Pictures from the 3/18/2023 rock show.

	Member of		
Next Annual Show February 24-25, 2024 Pasadena Convention Center			
CLGMS is on the Web: **http://www.clgms.org** FACEBOOK: CLEAR LAKE GEM AND MINERAL SOCIETY.	S.C.R.I.B.E.	American Federation of Mineral Societies	South Central Federation of Mineral Societies

Clear Lake Gem and Mineral Society, Inc

MEMBER: American Federation of Mineralogical Societies and South Central Federation of Mineral Societies

PURPOSE: To promote education and popular interest in the various earth sciences; in particular in those hobbies dealing with the art of lapidaries and the earth sciences of minerals, fossils and their associated fields.

2024 OFFICERS:			
	President	Cynthia McGowan	281-546-2662
	Vice President	David Tjiok	832-423-4802
	Secretary	Christina Rankin	281-723-5408
	Treasurer	Monica Duran	281-705-7875
	Program Director	VACANT	
	Board of Directors:	Sandra Christiansen	Jim Hawkins
		Jeff Mills	John Caldyne
		Donna Nelson	
	Newsletter Editor	David Tjiok	

Annual Show 2025 …….. Sandra Christiansen

Constitution & Bylaws……...Jim Hawkins
Community Benefits……..Charlie Timme
Historian……David Tjiok
Publicity……..…… Annabel Brownfield
Facebook……Cynthia McGowan

Membership……Mike Flannigan
WWW System Admin.. …….Mike Flannigan
Refreshments……..Lori Westerman
Education/Field Trips…….Annabel Brownfield
Field Trip Coordinator ……...Casey Renner

Membership Dues Jan. to Dec. 2024: Adult $15:00, Family Dues $20.00 (4+) at same address. Send Dues to CLGMS, PO BOX 891533, Houston, TX, 77289

Hands-On at the 3/18/2023 rock show.