Surrey Industrial History Group Newsletter

No 226 May 2020

www.sihg.org.uk

**How Did We Manage Before Refrigerators?**
Hatchlands Ice House

**The Wealdon Glass Industry**

Chiddingfold, the centre of the Wealden glass industry
(www.geograph.org.uk/photo/2382495, www.geograph.org.uk/photo/2382489)


## Future Meetings

Because of the **COVID-19** crisis numbers of activities have already been cancelled and the future of others is uncertain.

**SERIAC 2020**, due to take place on Sat 2 May at Goldsmiths College, has been cancelled.

We were planning to hold our AGM and award presentation at the Aviation Museum near Gatwick on 18 July, but this event is also unlikely to take place. The Chairman's report, together with the SIHG accounts, will therefore be circulated with the next Newsletter.

A copy of the proposed autumn programme for the Guildford lectures is enclosed, without an enrolment form, because whether people will be congregating by then is also uncertain.

The Leatherhead lecture programme is in abeyance as well.

Over the Summer some groups have started to hold virtual meetings and this may be a way forward. By the time of the next Newsletter the situation should be clearer. In the meantime, take care and keep an eye on our web site. Details of any resumed meetings will be listed as the information becomes available.

# SIHG Newsletter No 226 May 2020

*Programme Co-ordinator Bob Bryson: 01483 577809, meetings@sihg.org.uk.*

## The 45th season of SIHG
## Industrial Archaeology Lectures in Guildford

PROVISIONAL PROGRAMME - subject to Covid-19 restrictions

**Church House Guildford, 20 Alan Turing Road, Guildford GU2 7YF**

alternate Tuesdays, 19:30-21:30 (map: *www.sihg.org.uk)*

Single lectures at £5, payable on the night, are open to all.

| | |
|---|---|
| **2020** | |
| 6 October | **The Thames Barrier, History and Construction** / *Doug Irvine, Civil Engineer* |
| 20 October | **Archiving Redland Tiles: All Hands to the Pump** / *Malcolm Davison, Former Redland Group Publications Editor* |
| 3 November | **The History of Heathrow: From Stone Age to Jet Age** / *Nick Pollard, Curator Spelthorne Museum, Staines* |
| 17 November | **Nelson & HMS Victory: Their Lives and Times** / *Colin van Geffen, Artist & Historian* |
| 1 December | **William Morris - The Embodiment of Dreams** / *John Hawks, Wandle Industrial Museum* |
| 15 December | **Members' Talks Evening** - *Free to all / Short talks by members plus refreshments* |
| **2021** | |
| 12 January | **Where Are We on the Energy Front? Renewable Energy - Will it Give Us the Answers in Time?** / *Richard Rumble, Fetcham U3A* |
| 26 January | **Calcutta and Beyond - India's Industrial Heritage** / *Paul Whittle,Vice Chairman Darjeeling Himalayan Railway Society* |
| 9 February | **The Wealdon Iron Industry** / *Jeremy Hodgkinson, Wealdon Iron Research Group* |
| 23 February | **Barnes Wallis and his Inventions** / *Peter Hoar, Former Test Pilot* |
| 9 March | **tba** |

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**The History of Lighthouses**

The Pharos of Alexandria
The inspiration for the modern lighthouse
Three-dimensional reconstruction based on a comprehensive 2013 study,

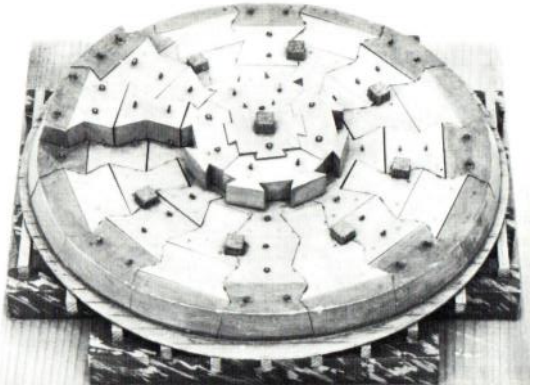
(https://en.wikipedia.org/wiki/File:PHAROS2013-3000x2250.jpg)

Report of the SIHG Lecture on 3 March 2020

# Sentinels of the Sea - The History of Lighthouses

*by Mark Lewis, Education Officer, Association of Lighthouse Keepers - report by Mike Davison*

Mark Lewis introduced us to the term "Pharology" which is the "study of lighthouses and other navigational aids". The Stevensons, for example, were known as pharologists. Lighthouses have the following two functions: 1. To warn of hazards such as sandbanks or reefs, and 2. To provide shipping with a feature on which they can take a bearing.



Model of the lower course of stonework of Eddystone lighthouse, in the Royal Scottish Museum, made by Josias Jessop in 1757

Where did the idea of lighthouses come from? Possibly it came from observing volcanoes, such as Etna, for example. The prototype for a lighthouse is believed to have been the Pharos at Alexandria. Nobody knows exactly what it looked like, but it was believed to have been very large. During the Roman period the early ones were a ziggurat type of structure. In England the first one was probably the Dover Pharos (1st Century AD). Then in Medieval times there were "Church Lights", such as St Catherines Oratory, IOW, and St Nicholas Chapel, Ilfracombe. In the 16C there were "sea marks", many of these being wood-fired. However they were not efficient and sometimes burnt down. Others were coal-fired, e.g. Dungeness (1635) and Mumbles (1794). They were all different.

Trinity House was established in 1514 and started life as the provider of pilotage in the Thames. In about 1830 it took over the design of all lighthouses. Today it is the General Lighthouse Authority for England and Wales, plus the Channel Islands and Gibraltar.

It was the hazardous Eddystone Rocks, 14 miles south of Plymouth, which ushered in a new era of lighthouse design. It presented one of the most difficult sites imaginable for the construction of a lighthouse, with the rocks being largely covered at high tide and the site being fully exposed to gales from any direction. After two earlier lighthouses had failed to survive, it was John Smeaton FRS who was brought in to design and build a new one. He designed a series of rings of interlocking dovetailed stone blocks around a single central block, to give the structure the necessary weight to resist the enormous overturning forces of the waves and wind. Furthermore the lower levels had a broader base, i.e. a greater diameter, with a curved profile, known as the Smeatonian curve. The structure was successfully completed in 1759 and still stands to this day.

For the light itself the fuel would be either wood, coal, or a candle array. Later, South Foreland was the first to use oil for lighting. The first reflector was the catoptric parabolic reflector by William Hutchinson (1715 – 1805). In France the Fresnel Lens was being developed (Fresnel 1788 – 1827) whereby the whole of the light source was surrounded by lenses to give a parallel beam. This could throw the beam up to 35 miles, and even today Fresnel lenses have proved to be the most successful, with the whole lens system floating on a bed of mercury. This means that the lens can rotate at a constant speed and, with one lens blanked out, a flashing sequence can be devised which identifies that particular lighthouse. Other refinements followed, such as foghorns, bells and even a gun.

On the subject of light-ships, we were told that the first one was placed at the Nore in the Thames Estuary in 1730. Another was positioned on the Goodwin Sands in 1793, and others were soon commissioned along the East coast. However, there were sometimes problems with capsizes, such as the South Goodwin light-ship in 1954, which killed the entire crew of seven.

Mark then touched on the construction of some of the more remote or difficult lighthouses, such as Muckle Flugga (Shetland), Bell Rock (East coast, Scotland - one of Stevenson's), and La Jument (Ushant, Brittany) completed in 1940. In the US they tended to prefer to go for the caisson method to build their lighthouses, e.g. Fourteen Foot Bank in Delaware (1875), which is 11 miles offshore.

This well-illustrated talk concluded with a word about the lighthouse keepers. To maintain self-respect most wore uniform. It became policy to have 3 keepers, and a typical watch was 8 weeks. Under extreme winter weather conditions it might mean that they could not be relieved for several weeks. The absolute priority was always to ensure the light shone every night; keepers would be dismissed if the light failed. This being before the advent of radio, every keeper had to be able to operate a semaphore. They also had to be able to cook and bake. Daily duties would be the cleaning of the glass and the lenses, and, where necessary, trimming of wicks. Keepers were always male, but in USA if a male keeper died, it was the tradition that the widow could take over as keeper.

In 1998 it was North Foreland which became the last lighthouse to be automated, and a way of life came to an end. ¤

# The Wealdon Glass Industry

*by Robert Bryson*

Most members will probably have heard about the Wealdon Iron Industry, but the fact that there was also a glass industry in the Weald is not so well known. Leafy Surrey and Sussex are not the most obvious places to find foundries until you recall that before the introduction of coke, iron foundries were charcoal fired. Abraham Darby the first established a coke-fired blast furnace in 1709 to produce cast iron. It was not until after 1768, when John Wilkinson built a more practical oven for converting coal into coke, that coke became a more popular fuel. By the mid 19c millions of tons of coke was being produced and used every year. Prior to this period wood was the major source of fuel and reading about coals in early documents you have to be careful because coal often meant charcoal unless the phrase pit or sea coal was used.

Knowing this, it is easier to understand why Surrey was such an industrial area in the 16c to 18c if you go for a walk and see all the old coppiced woodland. We know that charcoal was used as a fuel for the Wealden iron industry and in the manufacture of gunpowder. We also know that the South of England, especially the old Royal forests, provided the oak for shipbuilding. Wood was used in building timber-framed house, as a domestic fuel and for the manufacture of furniture, brooms, hurdles and hop poles. Even bricks were fired in wood burning kilns and of course the leather and cloth finishing trades also used wood for tanning and fuel.

Another industry, which does not get mentioned so often, is the glass industry. Today as you drive through Chiddingfold village you notice the pub and the green without realising that it was the birthplace of the English glass industry. The first mention of glass making was the grant of land in the area by Simon de Stocha in 1226, to Laurence the glass-maker (Vitreatius). Deeds of 1280 and 1300 also mention glass making. Apparently Beech wood was the preferred fuel and the side of a wooded hill the favourite furnace site. The first reference to window glass, as opposed to drinking vessels, dates back to 1352 when glass for St Stephen's Chapel at Westminster was purchased from Chiddingfold. The order included 303 pounds of white glass at £5 per pound!

A glass worker called John Shertere died in 1378 and his widow engaged a man from Staffordshire, John Glaswryth, to carry on the business paying him 6d for every hundred glass vessels he made and 20d for every shen or shev of brode glass (unit weight of window glass). This shows that at the time both drinking vessels and flat glass for glazing were being produced at Chiddingfold. The Shertere glass business passed into the hands of the Ropleys, and then the Peytos, in whose hands it remained until its demise. The burial registers of Chiddingfold Church contain entries for John Peytoe (1610) and a Will Peyto (1614) both listed as glassmakers.

Until the mid-sixteenth century the glass industry elsewhere in England was virtually non-existent, glass being mostly imported from France. As an example of how precious glass was at that time, it is recorded that when the Duke of Northumberland left Alnwick castle the steward was accustomed to take out the glazed windows and stow them away safely until the Duke's return.


17c glass furnace; showing blowing-irons, moulds and a broken wine bottle

In 1567, a Huguenot, Jean Carré, obtained a permit from Queen Elizabeth I to establish a forest industry for the manufacture of window glass. Carré built two glass furnaces in Fernfold, on the Sussex-Surrey border, and one in Sidney Wood in Surrey, near Alfold. The workforce was recruited from experienced glass-making families centred in the Lorraine region. Among those recruited were the Hennezells (Henseys) and Anthony Becku alias Dolyn. By this time no window glass was being produced at Chiddingfold, only small articles and rough goods such as urinals.

In a letter to Lord Burleigh in 1589 a George Longe, possibly a former Chiddingfold glass worker, petitioned against the monopoly granted to Carré and Dolyn for the manufacture of window glass. In

the letter he mentioned that there were only a total of fourteen to fifteen glasshouses in England.

Contrast this with the iron industry in the Weald, which grew rapidly from the middle of the 16c and reached its peak in 1600 when over one hundred sites were in production. Most of the early production was bar iron but castings were made, often for decorative purposes such as fire backs. From 1543 cast iron cannon were made but the navy did not adopt iron cannon until the 17c. By 1700 the output from the Weald was largely devoted to guns, iron bar being mostly imported from Sweden. The Weald dominated the trade in cannon until the 1770's when following the introduction of coke as a fuel the trade moved away to places like the famous Carron foundry in Falkirk. Coke was never used as a fuel in the Weald and the last furnace at Ashburnham closed in 1813.

It has been calculated that to keep a blast furnace operational required about 2,500 acres of coppiced woodland. One furnace and its associated forge could be supplied with charcoal from a radius of not more than three miles. (Incidentally, until 1767 iron masters were obliged by law to use slag to repair the roads.) One hundred furnaces operating in Surrey, Sussex and Kent would require 250,000 acres of coppice. Compare this to a total land area of modern Surrey of about 410,000 acres or the 35,800 acres of open space in Surrey. [All the land open to the public; National Trust, common land, or green belt.]

Between 1530 and 1590 the price of wood suitable for making charcoal rose from about 4d a cord [usually 128 cu ft] to 2s (24d), while the price of charcoal quadrupled between 1540 and 1600. An act of 1581 forbade the destruction of timber within 14 miles of the Thames for fuelling iron works and additional legislation sought to protect the timber supply for shipbuilding by prohibiting felling within 12 miles of the coast. In 1574 Christopher Barker a timber surveyor wrote: -

> "It may please your honour to consider the several notes ensuing which do concern the great spoil and consumption of Oak timber and other woods within the counties of Sussex, Surrey and Kent by means of iron mills and furnaces …. Unless speedy remedy be provided in this respect there shall not be timber sufficient to be had within these few years and for Her Majesty to build any ships or otherwise."

Unlike the iron industry that was driven from the Weald by the gradual introduction of coke fired furnaces, the glass industry was closed down much earlier and by legislation when it was shown that glass could be smelted using sea coal.

A patent was granted to Sir Edward Zouche for the construction of a coal fired glass furnace in Vauxhall as early 1611. This enterprise was soon taken over by Sir Robert Mansell, the Lord High Admiral, who in 1615 acquired the monopoly for the manufacture of glass in England. Admiral Sir Robert Mansell (1573-1656), concerned by the diversion of wood to charcoal production rather than ship-building, persuaded King James I to issue a Royal Proclamation banning the use of wood-fired glass furnaces, thereby forcing the use of coal. This made the use of wood as a fuel for glass furnaces illegal, although because of difficulties with the new process some glass continued to be made using wood illegally.

Mansell later built other glassworks and obtained a Royal Patent for the use of coal extending his monopoly on making the new glass. The annual rent, paid to the King for this exclusive licence to make glass was £1000 pa. In 1624 five new (coal fired) glass furnaces were erected by Mansell in London (Broad Street), Isle of Purbeck, Milford, Nottinghamshire, and Newcastle-on-Tyne.

The introduction of coal and coke thus saw the relocation of both the glass and the iron industry away from our area. The glass industry at Chiddingfold was already in decline when the law brought about its closure in 1615, while the much larger iron industry survived until the1770s with the last furnace closing in 1813. ¤

CURRENTLY CLOSED
**The Surrey Archaeological Society Research Centre**
at Abinger Hammer is normally open:
Mon 10:00-16:00; Tue 10:30-14:00; Wed 10:00-16:00
and the first Saturday of each month 10:00-13:30.
Phone: 01306 731275. [You are welcome to use the library.]

The **SIHG Membership Renewal Form**
is enclosed; please send it, with a cheque payable to
**'Surrey Archaeological Society'**,
to Surrey Archaeological Society (SIHG),
Hackhurst Lane, Abinger Hammer, Surrey RH5 6SE

# How Did We Manage Before Refrigerators? (Part 1)

*by Peter Tarplee*

The production of ice, iced drinks and frozen desserts as well as a suitable climate for keeping food fresh, is now commonplace, with refrigerators being used in almost every home, food shop and kitchen.

However, refrigerators are a comparatively recent invention and I wish later to explore what took place before refrigerators were available. First of all, though, very briefly, when did they first become available for the home? The first compressor-type domestic refrigerator was the *DOMELRE* (Domestic Electric Refrigerator), marketed in the USA in 1913, see image right. It had been made by Frederick F Wolf and although not a great commercial success was the first machine to include a tray for ice cubes. This was followed a year later by the *KELVINATOR*. In 1918 a machine called a *GUARDIAN* was made in Detroit, and later this was called a *FRIGIDAIRE*. By 1923 small Frigidaires were being exported to Britain, retailing at £60 (which was about 6 month's wages).

By 1927 Electrolux had started to make absorption-type refrigerators in Britain. These sold for £48 and needed to be connected to a cold water supply. By 1932 a small (1 cu ft) Electrolux model was available for under £20. So it wasn't until the 1930s that the cost of refrigerators for the home began to be anywhere within reach of families, and then only within the reach of well-off families. The first refrigerator with a deep-freeze compartment was produced in 1939; domestic freezers which could freeze fresh food were not available until 1955.

At the outbreak of World War II 200,000 British homes had fridges, and Kelvinator and Frigidaire refrigerators were being manufactured in the United Kingdom. The performance of these had very much improved during the 1930s after the fitting of thermostats, but the general use of fridges was delayed until there was a reliable source of electricity available everywhere. After World War II the number of homes with refrigerators rose rapidly, although by 1959 only 20% of homes had fridges, whereas nowadays the number of homes without fridges must be negligible.

Before domestic refrigerators became common, commercial cooling plant had been in use from the middle of the 19th century. Large steam-driven machines were in use in America in 1834; in Australia in 1851 and in France in 1856. Refrigerated ships were operating from the 1870s, enabling frozen meat to be imported to Europe from Australia, New Zealand and Argentine. The meat was then kept in a cold store and distributed in insulated railway wagons. The engineering firm J & E Hall of Dartford started in 1785 making steam engines and gun carriages; in 1886 they installed their first refrigeration plant in a ship and three years later they installed a frozen meat store at Smithfield Market. From that time Halls have remained one of the leading British manufacturers and suppliers of refrigeration equipment.

That was a brief summary of how refrigeration came to be available; but before there was any mechanical refrigeration much food was preserved by drying, or by salting or by pickling or by smoking it. The earliest British canning factory was opened in Bermondsey in 1812 but the meat was not good as they had yet to develop a system of excluding the air. Also, there were problems with poisoning from the lead linings of the tins. It was not until 1860 that the first can opener was invented, until then a hammer and chisel would have been needed.

By the middle of the 19th century ice boxes began to appear in private houses. These did not actually cool food but kept it cool by having it in a zinc or slate lined compartment which was surrounded by ice. One can often see these on visits to stately homes.

*In the 4th century BC Hippocrates said: most men would rather run the hazard of their lives or health than be deprived of the pleasures of drinking out of ice.* Alexander the Great (c.350 BC) had pits dug, filled with snow and covered with twigs and leaves to preserve the ice throughout the summer. This was, of course, an early ice house. There are records of ancient Romans and Persians using them as long ago as 1800 BC. The general use of ice houses in Britain began in the 17th century. Two of the earliest recorded were at Greenwich in 1619 and at Hampton Court in 1625. There appears to be no record of what happened to this latter ice house but in 1693 a 12-sided brick structure was built in Home Park near Kingston Gate. Repairs, including encircling it

with iron bands took place in 1700. This building survives.

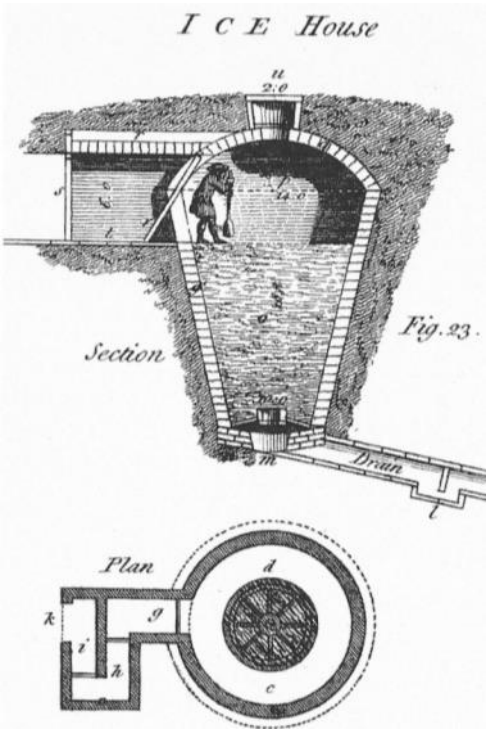
In 1660 an ice house had been built in Upper St James's Park (what is now Green Park) for the royal family, and soon other wealthy landowners made an ice house to be an essential part of any country estate. These families got used to having ice for cool drinks and frozen desserts and during the 18th and 19th centuries ice houses became more and more popular. The British ice houses were usually brick-built, many were underground or built into a mound or a natural bank. The entrance often faced north, sometimes it was under trees. Double doors were often installed to provide an air lock. A drain is essential, sometimes a wheel was used as a grating at the base of a circular ice house or well. Straw was packed between the ice, which was often mixed with salt.

Quoting from *An Encyclopedia of Gardening* by John Claudius Loudon, published in 1822:-

> *Ice is kept on the continent in cellars at a greater or less depth from the surface according to the climate. These cellars are without windows, surrounded by thick walls and entered by double or treble doors.*

He then goes on to describe the methods used for draining off the water from the melting ice. He says that the ice house should be large enough for two or three year's supply in case mild winters occur. The book gives detailed instructions for fitting doors and installing drains.

> *The new ice house should have time to dry out before ice is put in it. small faggots should be put in the bottom over the grating and then reeds or straw placed on that. The ice should be as thin as possible and preferably broken to a powder. It should be rammed close with a space left around the walls which is filled with straw.*





Ice cart delivering ice

So as early as 1822 this encyclopedia of gardening was giving fairly detailed instructions for ice house construction, indicating that they were commonly to be found in the grounds of large houses. In 1828 Charles McIntosh, in 'The Practical Gardener' wrote articles about building and using icehouses giving almost the same information. So this was the period when many large houses were installing ice houses in their grounds.

The filling of the ice house and the removal of the ice for the kitchen would have been the responsibility of the gardening staff but the amount of ice available would be entirely dependent on the weather, and the quality of the ice would depend on the cleanliness of the pond being used. The filling and removal of ice from the ice house was not a popular job with the gardeners and one reads of bribery with beer in order to get the work done speedily.

Here are details of some of our local ice houses, and their condition a few years ago:-

ABINGER HALL

This late 18th century ice house is south of the A25 whereas the house, which is now demolished, was north of the road. The ice house is adjacent to the river and close to the well and pump house which are still used for the water supply for the estate and its houses. This is one of the ice houses investigated by a group led by Stephen Fortescue.

ASHTEAD PARK HOUSE

This ice house is in the grounds of Ashtead Park Garden Centre, Farm Lane, about 140 metres north-east of Ashtead House. It is dated from the 18th century and any earth covering has been removed.

BROOME PARK, BETCHWORTH

The ice house here is north of the main house, near the pond. The ice house, which is complete except for the doors, is usually open for Heritage Open Days.

BURY HILL

The remains of the ice house for Bury Hill are adjacent to a footpath south of Westcott.

CONVENT OF THE SACRED HEART, EPSOM

An ice house, probably c.1700, brick-built into an earth mound, was originally part of The Elms estate which was visited by Celia Fiennes between 1708 and 1712 where she described there being an ice house. It is accessed from Saint Elizabeth Drive.

DORKING, DEEPDENE

This ice house was built to look like a small temple. It survives in the grounds of Kuoni House.

FETCHAM PARK

This was built in the 19th century and demolished in 1994. It was situated at the edge of a small quarry south of Fetcham church.

HATCHLANDS

This is perhaps the easiest to see near at hand; it is in National Trust grounds by a quarry in the gardens of Hatchlands and is, therefore, completely accessible.

HATCHFORD PARK.

This 19th century ice house is built into a slope in the grounds and is reached through a long tunnel with doors at the middle and at the entrance to the well.

JUNIPER HALL

This 19th century ice house has an additional chamber leading off its entrance tunnel. This was one of the ice houses investigated by a group led by Stephen Fortescue.

NORBURY PARK

The remains of this structure are near Ice House Combe which is shown on the OS maps. It is rectangular with flint walls and a natural chalk floor. Only the lower part of the walls remain.

OCKLEY COURT FARM

This 18th century ice house is above ground and has a tiled roof. It was restored in 1994-5 by The Society for the Protection of Ancient Buildings.

WOTTON HOUSE

The remains of Wotton House ice house survive by a footpath from Friday Street. ¤

(Read part 2 in the next Newsletter.)

The deadline for **submitting copy** for the next Newsletter is

**20 July 2020**

*Submissions are accepted by email to* news@sihg.org.uk*, on a memory stick or even in typescript.*
**Anything** *related to IA will be considered.*
*Please note that our Web address will be upgraded in the near future to be recognized as secure:*

| The SIHG Newsletter is now issued quarterly, covering: | | | |
|---|---|---|---|
| ***February*** | **May** | ***August*** | **November** |
| ***March*** | **June** | ***September*** | **December** |
| ***April*** | **July** | ***October*** | **January** |

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