METHODOLOGY AND SPECIFICATIONS GUIDE

argus

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ARGUS SULPHURIC ACID

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The most up-to-date Argus Sulphuric Acid methodology is available on www.argusmedia.com

Methodology overview

Methodology rationale

Argus strives to construct methodologies that reflect the way the market trades. Argus aims to produce price assessments which are reliable and representative indicators of commodity market values and are free from distortion. As a result, the specific currencies, volume units, locations and other particulars of an assessment are determined by industry conventions.

In the sulphuric acid markets, Argus publishes physical market prices in the open market as laid out in the specifications and methodology guide. Argus uses the trading period deemed by Argus to be most appropriate, in consultation with industry, to capture market liquidity.
In order to be included in the assessment process, deals must meet the minimum volume, delivery, timing and specification requirements in our methodology. In illiquid markets, and in other cases where deemed appropriate, Argus assesses the range within which product could have traded by applying a strict process outlined later in this methodology.

Survey process

Argus price assessments are informed by information received from a wide cross section of market participants, including producers, consumers and intermediaries. Argus reporters engage with the industry by proactively polling participants for market data. Argus will contact and accept market data from all credible market sources including front and back office of market participants and brokers. Argus will also receive market data from electronic trading platforms and directly from the back offices of market participants. Argus will accept market data by telephone, instant messenger, email or other means.

Argus encourages all sources of market data to submit all market data to which they are a party that falls within the Argus stated methodological criteria for the relevant assessment. Argus encourages all sources of market data to submit transaction data from back office functions.

Throughout all markets, Argus is constantly seeking to increase the number of companies willing to provide market data. Reporters are mentored and held accountable for expanding their pool of contacts. The number of entities providing market data can vary significantly from day to day based on market conditions.

For certain price assessments identified by local management, if more than 50pc of the market data involved in arriving at a price assessment is sourced from a single party the supervising editor will engage in an analysis of the market data with the primary reporter to ensure that the quality and integrity of the assessment has not been affected.

Market data usage

In each market, Argus uses the methodological approach deemed to be the most reliable and representative for that market. Argus will utilise various types of market data in its methodologies, to include:

- Transactions
- Bids and offers
- Other market information, to include spread values between grades, locations, timings, and many other data.

In many markets, the relevant methodology will assign a relatively higher importance to transactions over bids and offers, and a relatively higher importance to bids and offers over other market information. Certain markets however will exist for which such a hierarchy would produce unreliable and non-representative price assessments, and so the methodology must assign a different relative importance in order to ensure the quality and integrity of the price assessment. And even in markets for which the hierarchy normally applies, certain market situations will at times emerge for which the strict hierarchy would produce non-representative prices, requiring Argus to adapt in order to publish representative prices.

Verification of transaction data

Reporters carefully analyse all data submitted to the price assessment process. These data include transactions, bids, offers, volumes, counterparties, specifications and any other information that contributes materially to the determination of price. This high level of care described applies regardless of the methodology employed. Specific to transactions, bids, and offers, reporters seek to verify the price, the volume, the specifications, location basis, and counterparty. In some transactional average methodologies, reporters also examine the full array of transactions to match counterparties and arrive at a list of unique transactions. In some transactional average methodologies, full details of the transactions verified are published electronically and are accessible by subscribers. The deals are also published in the daily report.

Several tests are applied by reporters in all markets to transactional data to determine if it should be subjected to further scrutiny. If a transaction has been identified as failing such a test, it will receive further scrutiny. For assessments used to settle derivatives and for many other assessments, Argus has established internal procedures that involve escalation of inquiry within the source's company and escalating review within Argus management. Should this process determine that a transaction should be excluded from the price assessment process, the supervising editor will initiate approval and, if necessary, documentation procedures.

Primary tests applied by reporters

- Transactions not transacted at arm's length, including deals between related parties or affiliates.
- Transaction prices that deviate significantly from the mean of all transactions submitted for that day.
- Transaction prices that fall outside of the generally observed lows and highs that operated throughout the trading day.
- Transactions that are suspected to be a leg of another transaction or in some way contingent on an unknown transaction.
- Single deal volumes that significantly exceed the typical transaction volume for that market.
- Transaction details that are identified by other market participants as being for any reason potentially anomalous and perceived by Argus to be as such.

- Transaction details that are reported by one counterparty differently than the other counterparty.
- Any transaction details that appear to the reporter to be illogical or to stray from the norms of trading behaviour. This could include but is not limited to divergent specifications, unusual delivery location and counterparties not typically seen.
- Transactions that involve the same counterparties, the same price and delivery dates are checked to see that they are separate deals and not one deal duplicated in Argus records.

Secondary tests applied by editors for transactions identified for further scrutiny

Transaction tests

- The impact of linkage of the deal to possible other transactions such as contingent legs, exchanges, options, swaps, or other derivative instruments. This will include a review of transactions in markets that the reporter may not be covering.
- The nature of disagreement between counterparties on transactional details.
- The possibility that a deal is directly linked to an offsetting transaction that is not publicly known, for example a "wash trade" which has the purpose of influencing the published price.
- The impact of non-market factors on price or volume, including distressed delivery, credit issues, scheduling issues, demurrage, or containment.

Source tests

- The credibility of the explanation provided for the outlying nature of the transaction.
- The track record of the source. Sources will be deemed more credible if they
  - Regularly provide transaction data with few errors.
  - Provide data by Argus' established deadline.
  - Quickly respond to queries from Argus reporters.
  - Have staff designated to respond to such queries.
- How close the information receipt is to the deadline for information, and the impact of that proximity on the validation process.

Assessment guidelines

When insufficient, inadequate, or no transaction information exists, or when Argus concludes that a transaction based methodology will not produce representative prices, Argus reporters will make an assessment of market value by applying intelligent judgement based on a broad array of factual market information. Reporters must use a high degree of care in gathering and validating all market data used in determining price assessments, a degree of care equal to that applying to gathering and validating transactions. The information used to form an assessment could include deals done, bids, offers, tenders, spread trades, exchange trades, fundamental supply and demand information and other inputs.

The assessment process employing judgement is rigorous, replicable, and uses widely accepted valuation metrics. These valuation metrics mirror the process used by physical commodity traders to internally assess value prior to entering the market with a bid or offer. Applying these valuation metrics along with sound judgement significantly narrows the band within which a commodity can be assessed, and greatly increases the accuracy and consistency of the price series. The application of judgement is conducted jointly with the supervising editor, in order to be sure that guidelines below are being followed. Valuation metrics include the following:

Relative value transactions

Frequently transactions occur which instead of being an outright purchase or sale of a single commodity, are instead exchanges of commodities. Such transactions allow reporters to value less liquid markets against more liquid ones and establish a strong basis for the exercise of judgment.

- Exchange one commodity for a different commodity in the same market at a negotiated value.
- Exchange delivery dates for the same commodity at a negotiated value.
- Exchange a commodity in one location for the same commodity at another location at a negotiated value.

Bids and offers

If a sufficient number of bids and offers populate the market, then in most cases the highest bid and the lowest offer can be assumed to define the boundaries between which a deal could be transacted.

Comparative metrics

- The relative values between compared commodities are readily discussed in the market and can be discovered through dialogue with market participants. These discussions are the precursor to negotiation and conclusion of transactions.
- Comparison to the same commodity in another market centre.
- Comparison to a more actively traded but slightly different specification commodity in the same market centre.
- Comparison to the same commodity traded for a different delivery timing.
- Comparison to the commodity's primary feedstock or primary derived product(s).
- Comparison to trade in the same commodity but in a different modality (as in barge versus oceangoing vessel) or in a different total volume (as in full cargo load versus partial cargo load).

Volume minimums and transaction data thresholds

Argus typically does not establish thresholds strictly on the basis of a count of transactions, as this could lead to unreliable and non-representative assessments and because of the varying transportation infrastructure found in all commodity markets. Instead, minimum volumes are typically established which may apply to each transaction accepted, to the aggregate of transactions, to transactions which set a low or high assessment or to other volumetrically relevant parameters.

For price assessments used to settle derivatives, Argus will seek to establish minimum transaction data thresholds and when no such threshold can be established Argus will explain the reasons. These thresholds will often reflect the minimum volumes necessary to

produce a transaction-based methodology, but may also establish minimum deal parameters for use by a methodology that is based primarily on judgement.

Should no transaction threshold exist, or should submitted data fall below this methodology's stated transaction data threshold for any reason, Argus will follow the procedures outlined elsewhere in this document regarding the exercise of judgement in the price assessment process.

Transparency

Argus values transparency in energy markets. As a result, where available, we publish lists of deals in our reports that include price, basis, counterparty and volume information. The deal tables allow subscribers to cross check and verify the deals against the prices. Argus feels transparency and openness is vital to developing confidence in the price assessment process.

Swaps and forwards markets

Argus publishes forward assessments for numerous markets. These include forward market contracts that can allow physical delivery and swaps contracts that swap a fixed price for the average of a floating published price. Argus looks at forward swaps to inform physical assessments but places primary emphasis on the physical markets.

Publications and price data

Argus sulphuric acid prices are published in the Argus Sulphuric Acid report. Subsets of these prices appear in other Argus market reports and newsletters in various forms. The price data are available independent of the text-based report in electronic files that can feed into various databases. These price data are also supplied through various third-party data integrators. The Argus website also provides access to prices, reports and news with various web-based tools. All Argus prices are kept in a historical database and available for purchase. Contact your local Argus office for information.

A publication schedule is available at www.argusmedia.com

Corrections to assessments

Argus will on occasion publish corrections to price assessments after the publication date. We will correct errors that arise from clerical mistakes, calculation errors, or a misapplication of our stated methodology. Argus will not retroactively assess markets based on new information learned after the assessments are published. We make our best effort to assess markets based on the information we gather during the trading day assessed.

Ethics and compliance

Argus operates according to the best practices in the publishing field, and maintains thorough compliance procedures throughout the firm. We want to be seen as a preferred provider by our sub-scribers, who are held to equally high standards, while at the same time maintaining our editorial integrity and independence. Argus has a strict ethics policy that applies to all staff. The policy can be found on our website at www.argusmedia.com. Included in this policy are restrictions against staff trading in any energy commodity or energy related stocks, and guidelines for accepting gifts. Argus also has strict policies regarding central archiving of email and instant messenger communication, maintenance and archiving of notes, and archiving of spreadsheets and deal lists used in the price assessment process. Argus publishes prices that report and reflect prevailing levels for open-market arms length transactions (please see the Argus Global Compliance Policy for a detailed definition of arms length).

Consistency in the assessment process

Argus recognises the need to have judgement consistently applied by reporters covering separate markets, and by reporters replacing existing reporters in the assessment process. In order to ensure this consistency, Argus has developed a programme of training and oversight of reporters. This programme includes:

- A global price reporting manual describing among other things the guidelines for the exercise of judgement
- Cross-training of staff between markets to ensure proper holiday and sick leave backup. Editors that float between markets to monitor staff application of best practices
- Experienced editors overseeing reporting teams are involved in daily mentoring and assisting in the application of judgement for illiquid markets
- Editors are required to sign-off on all price assessments each day, thus ensuring the consistent application of judgement.

Review of methodology

The overriding objective of any methodology is to produce price assessments which are reliable and representative indicators of commodity market values and are free from distortion. As a result, Argus editors and reporters are regularly examining our methodologies and are in regular dialogue with the industry in order to ensure that the methodologies are representative of the market being assessed. This process is integral with reporting on a given market. In addition to this ongoing review of methodology, Argus conducts reviews of all of its methodologies and methodology documents on at least an annual basis.

Argus market report editors and management will periodically and as merited initiate reviews of market coverage based on a qualitative analysis that includes measurements of liquidity, visibility of market data, consistency of market data, quality of market data and industry usage of the assessments. Report editors will review:

- Appropriateness of the methodology of existing assessments
- Termination of existing assessments
- Initiation of new assessments.

The report editor will initiate an informal process to examine viability. This process includes:

- Informal discussions with market participants
- Informal discussions with other stakeholders
- Internal review of market data

Should changes, terminations, or initiations be merited, the report editor will submit an internal proposal to management for review

and approval. Should changes or terminations of existing assessments be approved, then formal procedures for external consultation are begun.

Changes to methodology

Formal proposals to change methodologies typically emerge out of the ongoing process of internal and external review of the methodologies. Formal procedures for external consultation regarding material changes to existing methodologies will be initiated with an announcement of the proposed change published in the relevant Argus report. This announcement will include:

- Details on the proposed change and the rationale
- Method for submitting comments with a deadline for submissions
- For prices used in derivatives, notice that all formal comments will be published after the given consultation period unless submitter requests confidentiality.

Argus will provide sufficient opportunity for stakeholders to analyse and comment on changes, but will not allow the time needed to follow these procedures to create a situation wherein unrepresentative or false prices are published, markets are disrupted, or market participants are put at unnecessary risk. Argus will engage with industry throughout this process in order to gain acceptance of proposed changes to methodology. Argus cannot however guarantee universal acceptance and will act for the good order of the market and ensure the continued integrity of its price assessments as an overriding objective.

Following the consultation period, Argus management will commence an internal review and decide on the methodology change. This will be followed by an announcement of the decision, which will be published in the relevant Argus report and include a date for implementation. For prices used in derivatives, publication of stakeholders' formal comments that are not subject to confidentiality and Argus' response to those comments will also take place.

Introduction

Argus publishes Argus Sulphuric Acid once a week on a Thursday afternoon. The report contains global sulphuric acid prices, market commentary, trade data and information on related markets, including sulphur, fertilizers and base metals.

General methodology

The Argus Sulphuric Acid team consists of specialist market reporters/analysts in London as well as Argus' global network of correspondents.

The market survey involves a wide cross-section of sulphuric acid market participants during the week via telephone, email or instant messenger. A balance is maintained in the survey between sellers, buyers and trading companies. The survey seeks to discover deals done, bids, offers, other relevant valuations of market levels and fundamentals data.

The report seeks to determine ranges in which transactions are taking place or in which transactions could have taken place between a willing buyer and seller. Argus publishes prices that report and reflect prevailing levels for open market, arms length transactions (please see the Argus Global Compliance Policy for a detailed definition of arms length).

Publishing schedule

Argus Sulphuric Acid is published every Thursday evening in the UK. A report is not published in the week between 25 December and 1 January, depending on how the Christmas and New Year holidays fall. In the event of a UK holiday falling on a Thursday, Argus Sulphuric Acid will assess all prices on the Wednesday and publish on the Wednesday.

An abbreviated report is published during the International Fertilizer Industry Association (IFA) annual conference, which usually takes place in late May or early June.

Price assessments

Argus uses a variety of methodological approaches to identify market prices. Usually Argus identifies prices through an analysis of bids, offers, and transactional information. Argus reduces the possibility of price report manipulation, or unintended distortion, by applying intelligent interpretation to the weighting of information it receives. Argus works to validate all deal prices, counterparties, and volumes.

Price assessments for sulphuric acid represent a range in which a deal between a willing buyer and seller could have been done from Friday morning until the following Thursday afternoon. All information over the course of the trading week prior to publication is taken into account. Market information will be collected until 5:00pm UK time on the Thursday of publication. Deals, bids and offers must be considered repeatable to be reflected in the assessments.

When there is adequate liquidity and trade is deemed reliable and representative, Argus will establish the published price range by using the low and the high of confirmed deals done throughout the trading week. To qualify to set the low or high of the week, deals must meet the minimum volumes and strict delivery, timing, and specification requirements in our methodology.

Should a deal fall well outside of the channel of trade or raise other concerns, Argus will subject the deal to further scrutiny, which will involve consultation with industry sources and review by senior Argus management. This process is critical to ensuring that the Argus range of trade remains representative. Argus reserves the right to exclude deals from the range of trade.

In the absence of verified high or low deals, Argus makes an intelligent assessment of the high-low range at which deals could have been done, in view of market discussions with buyers and sellers, and what we consider to be achievable given prices paid in end-user markets. Where there has been no discoverable business for a specific pricing point, prices are usually held at the previous range, but Argus reserves the right to make an assessment of the range based on what deals could have been achieved within that time-frame based on market fundamentals. During periods of low trade, price ranges may be highlighted as indicative to show there has been no discoverable business done on that specific pricing point.

Sulphuric acid

Price assessments in Argus Sulphuric Acid are for sulphuric acid (H2SO4) produced through the smelting of base metals, from sulphur burning or from pyrite roasting. Product must meet the following specifications:

- 93-98pc grade
- Iron (Fe) <50 ppm concentration
- Nitrate (NO3+) <5 ppm concentration
- Mercury (Hg) <1 ppm concentration
- Arsenic (As) <1 ppm concentration

Argus assesses sulphuric acid prices in various trading regions. Prices are assessed on a fob basis in the main export regions and on a cfr basis in the main consuming markets. All sulphuric acid prices are assessed in US dollar ($)/t with the exception of NW European contract prices which are assessed on a euro (€)/t basis, the currency under which they are agreed. Prices are assessed through the market survey process. In addition to information obtained through market surveys, fob prices for export points can be assessed on the basis of cfr business to main delivery points with appropriate freight costs deducted.

Spot prices are for sulphuric acid to be shipped within 30 days and contract prices are for time periods specified.

Cargoes ranging between 4,000-30,000t are considered for all price assessments. Deliveries by vessel (2,500t or above) or barge (500-2,500t) are considered only for the NW Europe contract assessment.

Spot prices

Fob price assessments

NW Europe

The northwest Europe spot price assessment is based on a metric tonne fob basis and represents spot material exported/to be exported from ports in Belgium, Germany, the Netherlands and Scandinavia, and from the Spanish ports of Aviles and Huelva to offshore markets, such as North America, Latin America and North Africa. A typical vessel carries 18,000-20,000t of sulphuric acid.

In all references:

- t = metric tonne
- st = short ton
- lt = long ton
- cfr = cost and freight
- cif = cost, insurance and freight
- fob = free on board

Mediterranean

The Mediterranean spot price assessment is based on a metric tonne fob basis and represents spot material exported/to be exported from the Mediterranean region to destinations within the region or to markets abroad. Export countries include Algeria, Bulgaria, Greece, Italy and Spain, and importing markets include France, Morocco, Portugal, Spain, Tunisia and Turkey. Small or regional exports from the Spanish ports of Aviles and Huelva are included in this assessment. A typical vessel carries 10,000-15,000t of sulphuric acid, but any vessel carrying 4,000t or above from Gela, Italy, is also included in the assessment.

Note: Exports from the Spanish ports of Aviles and Huelva are divided by volume and destination between the northwest Europe and Mediterranean price assessments. Larger volumes (18,000-20,000t) exported abroad from these ports are included in the northwest Europe assessment. Smaller volumes (10,000-15,000t) and those exported to regional markets from these ports are included in the Mediterranean assessment.

South Korea/Japan

The South Korea/Japan spot assessment is based on a metric tonne fob basis and represents the market price for material exported/to be exported from ports in South Korea or Japan to any offshore markets, such as Chile, China, India or southeast Asia.

China

The China spot assessment is based on a metric tonne fob basis and represents the market price for smelter acid exported/to be exported from China to offshore markets, such as Oceania or southeast Asia. Two Lions Fine Chemical is an active producer of sulphur-based sulphuric acid and occasionally exports from the port of Zhangjiagang in Jiangsu to offshore markets. Exports of sulphur-based sulphuric acid from Jiangsu are also used for assessment purposes.

Cfr price assessments

Chile

The Chile spot assessment is based on a metric tonne cfr/cif basis. Chile is fed by contractual and spot imports from Peru and other offshore countries, such as Japan, Mexico, the Philippines, South Korea and Spain. The price assessment represents a high-low range in which a spot deal could have been sold from local markets — Chile and Peru — and any offshore origin to the Mejillones terminal in Region II. Sulphuric acid delivered from local markets has freight advantage and may fall on the low end of the assessment range, depending on market fundamentals.

Brazil
The Brazil spot assessment is based on a metric tonne cfr basis and represents spot material delivered from any offshore origin, such as Germany and Spain to the ports in Brazil, including Paranagua and Rio Grande.

India
The India spot assessment is based on a metric tonne cfr basis and represents spot material delivered from any offshore origin, such as Indonesia, Japan, the Philippines and South Korea to the ports in India. A typical vessel carries 15,000-20,000t of sulphuric acid.

North Africa
The north Africa spot assessment is based on a metric tonne cfr basis and represents spot material delivered from any offshore origin to the ports of Jorf Lasfar and Safi in Morocco, and Gabes in Tunisia.

US southeast
The US southeast spot vessel import assessment is based on a metric tonne cfr basis and represents spot material delivered from any offshore origin to any sulphuric acid receiving point in the US in the states of Florida, Georgia, Louisiana, Mississippi, North Carolina and Texas.

Southeast Asia
The southeast Asia assessment is based on spot sales to end-buyers in markets including Vietnam, Malaysia, Indonesia, Thailand, Singapore and the Philippines. The high-end of the published assessment reflects cargoes typically ranging 4,000-10,000t, and the low-end cargoes 10,000t and above. Contract or formula-related sales are excluded from the assessment.

Contract prices

cfr contract prices

Chile
The Chile contract assessment is based on a metric tonne cfr/cif basis. The range represents annual contract prices Chilean buyers agree to pay for supplies from the domestic Chilean market and from Peru only. The price will be assessed once a year during the fourth quarter of the preceding year after market participants report settlements. This typically occurs in November, but may vary as the market develops. Contract prices for supplies from other regions, such as Japan, Mexico, the Philippines Spain and South Korea, may be discussed in text but will not be used for assessment purposes.

NW Europe (smelter)
The northwest Europe contract assessment is based on a half-yearly (January- June, July- December) and quarterly (January- March, April- June, etc) basis for smelter acid contracts between domestic consumers and suppliers for delivery by vessel (2,500t or above) or barge (500-2,500t). Prices are assessed on a metric tonne per € basis, the currency in which contacts are agreed. Contract prices are assessed upon settlement, which may not occur until well into the first month of the corresponding period, for example late January for half year assessment or late April for second quarter assessment. Prices for annual contracts or contracts for delivery by rail and trucks within northwest Europe may be discussed in text but will not be used for assessment purposes.

China
The China contract assessment is quarterly pricing (January- March, April- June, etc) and based on a metric tonne cfr basis. This represents contract prices for which Japanese and South Korean sulphuric acid is imported into China for domestic consumption. Contract prices are assessed upon settlement, which may not occur until well into the first month of the corresponding period, for example late April for second quarter assessment.

Freight rates

The spot freight rate table in Argus Sulphuric Acid shows the week's $ per tonne rate for seaborne routes with most activity, the prior week's spot rate and the change since the last publication.

Price assessments reflect spot business based on fixtures and/or the price at which vessels could be fixed given prevailing market conditions. Freight rates provide an indication of a normal market fixture for a spot vessel carrying 18,000-20,000t of sulphuric acid, loading within the next 30 days. A separate freight assessment for smaller vessels, or routes not listed in the table, may be established in text if information is available through Argus' market survey process.

Spot freight rates

Northwest Europe to
- US Gulf
- North Africa
- Brazil
- Chile

Northwest Europe in the freight table refers to ports in Belgium, Germany, the Netherlands and the Spanish ports of Aviles and Huelva. Rates for vessels from other European countries, including Bulgaria, Finland, Norway, Poland, Sweden and Spain may be established in text if information is available.

Mediterranean to
- US Gulf
- North Africa

The Mediterranean region in the freight table refers to the port of Huelva in Spain, one of the most active sulphuric acid export ports in the region. Rates for vessels from Italy or the Spanish port of Aviles may be established in text if information is available.

Note: Freight rates for voyages from the Spanish ports of Aviles and Huelva are divided by volume and destination between the northwest Europe and Mediterranean freight rate assessments. Larger volumes

(18,000-20,000t) exported abroad from these ports are included in the northwest Europe assessment. Smaller volumes (10,000-15,000t) and those exported to regional markets from these ports are included in the Mediterranean assessment.

South Korea/Japan to

- East coast India
- China
- southeast Asia*
- Chile
- US Gulf

**Note: The southeast Asia rate is the cost of shipping at least 4,000t, in line with the southeast Asia cfr sulphuric acid price assessment specification.*

Freight rates are assessed by surveying freight providers and buyers of spot freight, maintaining a balance between both parties. Argus makes an assessment of the range between the low and high prices provided