Attachment B: Examples

Reserve Sale Notice
California Cap-and-Trade Program Sale of Greenhouse Gas Allowances from the Allowance Price Containment Reserve

This document (Attachment B) provides information and examples of how to determine the amount of a bid guarantee, how holding limits are applied, and examples of how reserve sales are settled. Allowances purchased at reserve sales are deposited directly into an entity's compliance account. ***Only California covered entities and opt-in covered entities are eligible to participate in reserve sales***.

This attachment also clarifies that submitted bids that contain bid quantities in excess of the holding limit or that have a maximum value greater than the bid guarantee, will be rejected in bundles of 1,000 allowances during the purchase determination process, until all limits are met.

This document is guidance only and does not supersede the California Cap-and-Trade Regulation (Regulation). In circumstances of uncertainty, the Regulation is the controlling document.

I. Determining an Entity's Bid Guarantee

Table 1 presents hypothetical bid submissions for a reserve sale in which three entities are participating. Each row in Table 1 provides the bid value at each tier price. The Auction and Reserve Sale Administrator (Auction Administrator)[1] will accept bids for lots of Allowance Price Containment Reserve (APCR) allowances; each bid lot represents 1,000 APCR allowances.

[1] For simplicity, the Auction and Reserve Sale Administrator is referred to as the Auction Administrator in all notices regarding auctions and reserve sales.

Table 1: Reserve Sale Bid Submissions

Entity Name	Tier Price	Bid Lots	Bid Number of Allowances	Bid Value[2]
A	$45.20	500	500,000	$22,600,000
A	$50.86	300	300,000	$15,258,000
A	$56.51	100	100,000	$5,651,000
B	$45.20	750	750,000	$33,900,000
B	$50.86	500	500,000	$25,430,000
B	$56.51	300	300,000	$16,953,000
C	$45.20	200	200,000	$9,040,000
C	$50.86	100	100,000	$5,086,000
C	$56.51	50	50,000	$2,825,500

Table 1 Terminology

Bid Number of Allowances = Bid Lots * 1,000

Bid Value = Bid Number of Allowances * Tier Price

To determine the minimum bid guarantee that should be submitted to avoid having bids rejected when there are multiple bids at different tiers, the following process would apply:

Example 1: Calculating a Bid Guarantee When Submitting Multiple Bids

As shown in Table 1, Entity A has submitted one bid in each of the three tiers. The reserve sale may result in the complete fulfilment of the entity's bid schedule. Thus, the bid guarantee is the sum of each entity's bids.

- Tier 1: Entity A bid for 500,000 APCR allowances at a cost of $22,600,000.
- Tier 2: Entity A bid for 300,000 APCR allowances at a cost of $15,258,000.
- Tier 3: Entity A bid for 100,000 APCR allowances at a cost of $5,651,000.

[2] For simplicity, all currency data in this Attachment B other than Tier Price is shown rounded to whole dollars.

Entity A's bid schedule shows that it is willing to purchase a total of 900,000 APCR allowances at a total bid value of $43,509,000. **Entity A should submit a bid guarantee of at least $43,509,000 if it wants to buy all the APCR allowances in its bid schedule.**

Entities bidding in a reserve sale will be limited to incurring a total cost less than or equal to the dollar amount of the bid guarantee submitted and should evaluate their bids against the bid guarantee they provided in the manner illustrated in this example. Bidders submit a bid guarantee that is used first to satisfy purchases in the lowest-priced tier. Any portion of the bid guarantee remaining after the lowest-priced tier purchases are satisfied is subsequently applied to higher-priced tiers in succession until either all allowances are sold from the APCR or all the qualified bids are filled. A qualified bid refers to a bid used in the reserve sale settlement process after the submitted bids have been evaluated against the holding limits and bid guarantee. The Regulation requires bid guarantees to be greater than or equal to the maximum value of the bids to be submitted.

The minimum bid guarantee Entities A, B, and C should submit to avoid having their bid(s) rejected in bundles of 1,000 allowances by the Auction Administrator would be as follows:

- Entity A – $43,509,000
- Entity B – $76,283,000
- Entity C – $16,951,500

II. Entity Bid Evaluation Procedures for Purchase Limits and Holding Limits

A. <u>Purchase Limits</u>

There are no purchase limits for reserve sales.

B. <u>Holding Limits</u>

Holding limits are based on the following formula:

Holding Limit = 0.1 * Base + 0.025 * (Annual Allowance Budget – Base)

Where:

"Base" equals 25 million metric tons of carbon dioxide equivalent (CO_2e).

"Annual Allowance Budget" is the number of allowances issued for the

current budget year.[3]

For 2015, the annual budget in California and Québec is 459,800,000 allowances.

Holding Limit = 0.1 * 25,000,000 + 0.025 * (459,800,000 - 25,000,000)

2015 Holding Limit = 13,370,000 allowances

C. Maximum Number of Allowances an Entity Can Hold

The holding limit is the maximum number of allowances an entity may hold or the maximum number of allowances that may be jointly held by a group of entities with a direct corporate association. Allowances purchased in the reserve sale are subject to the current vintage holding limit detailed in section 95920(c)(1) of the Regulation. The current vintage holding limit applies to allowances from the current calendar year, previous calendar years, and allowances purchased from the APCR.

A covered entity may exempt a limited number of allowances from the current vintage holding limit by transferring them to its compliance account. This "limited exemption" is described in section 95920(d)(2) of the Regulation. The limited exemption is based on an entity's emissions, and is designed to allow covered entities the ability to accumulate the allowances they need for compliance. For that reason, the limited exemption is increased each year by the amount of the entity's emissions contained in the most recent verified emissions data report. The limited exemption is decreased at the end of the year following the close of a compliance period, after the entity has completed its surrender obligation for the compliance period.

Entities can calculate the maximum number of allowances they can hold using the following example (Example 2).

Example 2: Determining the Maximum Number of Allowances an Entity Can Hold and Purchase to Comply with the Holding Limit

The maximum number of allowances an entity can hold at one time equals the holding limit plus the limited exemption. The limited exemption is the number of allowances that are exempt from the holding limit calculation if held by an entity in its compliance account. Assuming an entity takes full advantage of the limited

[3] The annual allowance budget in a linked program includes allowances issued by all participating jurisdictions.

exemption, in 2015, the maximum number of allowances that may be held is calculated as:

Maximum Number of Allowances Held = 13,370,000 + Limited Exemption

When submitting bids in a reserve sale, an entity may not exceed the applicable holding limit. Suppose an entity's limited exemption is equal to 4,000,000 metric tons and it holds 1,000,000 allowances in its compliance account and an additional 2,000,000 vintage 2015 allowances in its general holding account; in this case, the maximum number of allowances the entity can hold and stay within the holding limit is:

Maximum Number of Allowances Held =

13,370,000 + 4,000,000 – 1,000,000 – 2,000,000 = 14,370,000 allowances.

Entities can hold more allowances in their compliance account than allowed under the limited exemption, but any allowances in excess of the limited exemption will count towards the holding limit. If the entity in the prior example had a compliance account balance of 4,500,000 allowances, the following represents the allowances which may be purchased without exceeding the holding limit:

Maximum Number of Allowances Held =

13,370,000 + 4,000,000 – 4,500,000 – 2,000,000 = 10,870,000.

If APCR allowances are purchased at a reserve sale, the APCR allowances are placed directly in the entity's compliance account. Any allowances in the compliance account in excess of the limited exemption will be considered in the calculation of the entity's account holdings compared to the holding limit.

III. Auction Administrator Application of the Bid Evaluation Criteria

Submitted bids that contain bid quantities in excess of the holding limit or have a maximum value in excess of the bid guarantee will be rejected, in bundles of 1,000 allowances, until all bid limitations are met. Only that portion of the bid quantity that exceeds one or more limit will be rejected, not the entire bid quantity. "Qualified bids" are the bids that remain after the submitted bids have been evaluated and reduced to meet all limits. For example, if the bid guarantee limitation is satisfied by the purchase of no more than 10,000 allowances and the holding limit is satisfied by the purchase of no more than 25,000 allowances, the qualified bid is less than or equal to 10,000

allowances. Only qualified bids are used in the reserve sale settlement process. Determination of qualified bids occurs after the bid window has been closed and before the final purchase determinations are made.

IV. Bid Fulfillment

Starting with allowances in the lowest-priced tier, allowances will be sold to entities that submit qualified bids to the lowest-priced tier. Given that each price tier contains a fixed number of APCR allowances, there are three potential outcomes for the sale of allowances within each tier:

- The quantity of qualified bids exactly corresponds to the quantity of allowances available in a given tier. All bids are filled and no allowances remain in the tier.
- The quantity of qualified bids exceeds the quantity of allowances in a given tier. This will result in the tiebreaker process detailed in section 95911(e)(5) of the Regulation under which allowances are sold based on each bidder's proportion of all qualified bids.
- The quantity of qualified bids is fewer than the number of allowances in a given tier. This will result in a tier roll-down as detailed in section 95913(h)(4) of the Regulation under which qualified bids from the next higher-priced tier are sold allowances at the lower tier price until the number of allowances in the lower-priced tier is exhausted.

A. <u>Tiebreaker Process</u>

Should the sum of qualified bid quantities for any tier exceed the quantity of allowances in that tier, the Auction Administrator will allocate allowances to entities based on their share of qualified bids submitted to that tier. Only qualified bids submitted to the oversubscribed tier (not the total qualified bids placed across the three tiers) will be used to determine an entity's share of allowances bid for in a tiebreaker process.

Each entity is awarded allowances based on its share times the number of allowances available for sale in the tier, rounded down to the nearest whole allowance. If there are allowances remaining as a result of rounding down, those allowances are awarded to entities by assigning a random number to each entity. The remaining allowances are awarded to entities starting with the lowest assigned random number and proceeding to the next higher random number until all remaining allowances are awarded. Under the tiebreaker procedure, allowances may not be sold in bundles of 1,000.

Example 3: Bid Fulfillment with a Tiebreaker

Examples 3, 4, and 5 represent one reserve sale across Tier 1, 2, and 3, respectively. These examples utilize the bid schedules for Entities A, B, and C in Table 1 and the bid guarantees in Example 1. In this example, the supply of allowances in each tier is 1,000 bid lots equal to 1,000,000 allowances. Example 3 shows the settlement of a reserve sale when there is an excess demand for allowances in a tier. Example 3 shows a tiebreaker in Tier 1 but the tiebreaker methodology is applicable to any tier of the reserve sale.

Table 2 presents the cumulative bids of the three entities for Tier 1. **These entity bids are qualified bids and do not violate the entities' holding limits or bid guarantees.** Each entity has submitted a bid guarantee amount sufficient to cover all bids in the bid schedule in Table 1.

Table 2: Tier 1 Bid Fulfillment with a Tiebreaker

Entity Name	Tier Price	Tier 1 Bid Lots	Qualified Tier 1 Allowances	Proportion	Tier 1 Allowances Sold
A	$ 45.20	500	500,000	0.34482759	344,827
B	$ 45.20	750	750,000	0.51724138	517,241
C	$ 45.20	200	200,000	0.13793103	137,932
Total		**1,450**	**1,450,000**	**1.00**	**1,000,000**

Since the quantity of qualified bids is 1,450,000 allowances and only 1,000,000 allowances are available for sale from Tier 1, a tiebreaker procedure is required. Each entity is sold allowances as a proportion of their qualified bids to the total quantity of qualified bids submitted to the oversubscribed tier. For example, Entity A's qualified bid is 500,000 allowances and its proportion to the total quantity of qualified bids is 500,000/1,450,000 = 0.344822759. The proportion is then multiplied by the number of allowances available and rounded down to the nearest whole allowance, in this case, 0.0344822759 * 1,000,000 = 344,827 allowances. The rounding down of allowances results in 999,999 total allowances sold. To sell the residual allowance, each entity is assigned a random number and the allowance is awarded to the entity with the lowest random number. In this example, Entity C with the lowest random number receives the residual allowance (changing the number of allowances sold to Entity C from 137,931 to 137,932).

The total number of allowances sold in Tier 1 and the resulting bid cost of each entity is as follows:

- Entity A – 344,827 allowances at a total cost of $15,586,180.
- Entity B – 517,241 allowances at a total cost of $23,379,293.
- Entity C – 137,932 allowances at a total cost of $6,234,526.

After completing the sale of the lowest-price tier, the Auction Administrator will proceed to Tier 2, and finally to Tier 3. Allowances purchased in Tier 1 reduce the allowances a reserve sale participant may acquire in Tier 2 before exceeding their holding limit. The total cost of allowances purchased in Tier 1 is deducted from the entity's bid guarantee, reducing the remaining bid guarantee that can be applied to subsequent tier sales. Thus, evaluation of submitted bids in Tier 2 is based on the remaining bid guarantee and allowances that may be acquired before exceeding their holding limit.

B. An Undersubscribed Tier Sale: The Roll-Down Procedure

If allowances remain in a tier after all qualified bids are filled, the tier is undersubscribed relative to qualified bids. The Auction Administrator will sell the remaining allowances of the undersubscribed tier by "rolling down" qualified bids from the next higher-priced tier. To accomplish this, the Auction Administrator evaluates all bids from the next higher-priced tier with respect to the remaining bid guarantee and holding limit of each entity. The bid guarantee evaluation in the "roll-down" procedure is based on the tier price of the lower tier. Then, a random number is assigned to each bundle of 1,000 allowances in a qualified bid. The remaining allowances in the lower-price tier will be sold to bidders in the next tier, starting with the lot assigned the lowest random number and proceeding in increasing order of random numbers until all the allowances in the lower-priced tier are sold. The price for the allowances sold under this procedure is the price of the tier from which they are sold, not the tier price under which the bid was submitted. The remaining bids from the next higher-priced tier, if any, will be sold at that tier price. Qualified bids can be evaluated in a roll-down procedure at one tier price, but cannot be considered for the roll-down procedure from the highest-price tier to the lowest-price tier.

Example 4: Bid Fulfillment with Excess Tier Allowances

After the sale from Tier 1, detailed in Example 3, the Auction Administrator moves on to the sale of allowances in Tier 2, where allowances are priced at $50.86. Table 3 outlines the bids of the three entities for the two remaining tiers (Tier 2 and Tier 3).

Table 3: Tier 2 and Tier 3 Allowance Bids

Entity Name	Tier Price	Bid Lots	Qualified Bid Allowances
A	$ 50.86	300	300,000
B	$ 50.86	500	500,000
C	$ 50.86	100	100,000
Tier 2 Total		**900**	**900,000**
A	$ 56.51	100	100,000
B	$ 56.51	300	300,000
C	$ 56.51	50	50,000
Tier 3 Total		**450**	**450,000**

Given a supply of 1,000,000 allowances in Tier 2, there is an excess of 100,000 allowances after the qualified Tier 2 bids have been fulfilled. To sell these remaining allowances, the 450 qualified bid lots in Tier 3 will be split into individual bundles of 1,000 allowances and each Tier 3 bid lot will be assigned a random number.

The remaining 100,000 allowances in Tier 2 will be sold in bid lots from Tier 3 starting with the bid lot assigned the lowest random number and proceeding in increasing order. Given 450 bid lots submitted in Tier 3, there will be a total of 450 random numbers assigned to bid lots from bids submitted by the entities. In this example, 100 bid lots for Entity A are assigned random numbers, 300 bid lots for Entity B are assigned random numbers, and 50 bid lots for Entity C are assigned random numbers. The excess Tier 2 allowances will be sold starting with the Tier 3 bid lot assigned the lowest random number and proceeding in increasing order until all 100 excess bid lots have been sold.

Table 4 shows the final result of the roll-down in Tier 2. In the roll-down procedure the 450 Tier 3 bid lots are ranked in ascending order of their assigned random number. Since there are 100 bid lots remaining in Tier 2 after the fulfillment of all qualified bids, the 100 Tier 3 bid lots with the lowest random number will be sold in Tier 2. In this example, 29 bid lots are from Entity A bids, 59 from Entity B bids, and 12 from Entity C bids. These 100 Tier 3 bid lots are filled with Tier 2 allowances.

Table 4: Tier 2 Roll-Down Bid Fulfillment

Entity Name	Tier Price	Tier 2 Bid Lots	Qualified Tier 2 Allowances	Roll-Down Tier 3 Allowances	Tier 2 Allowances Sold
A	$ 50.86	300	300,000	29,000	329,000
B	$ 50.86	500	500,000	59,000	559,000
C	$ 50.86	100	100,000	12,000	112,000
Total		**900**	**900,000**	**100,000**	**1,000,000**

The 1,000,000 allowances sold in the Tier 2 sale are sold at a price of $50.86 regardless of the tier in which the bid was originally submitted, including qualified Tier 3 bids sold allowances from Tier 2. The total number of Tier 2 allowances sold and the resulting bid cost for each entity is as follows:

- Entity A – 329,000 allowances at a total cost of $16,732,940.
- Entity B – 559,000 allowances at a total cost of $28,430,740.
- Entity C – 112,000 allowances at a total cost of $5,696,320.

Example 5: Tier 3 Sale after a Tiebreaker and Roll-Down

The reserve sale continues until either all the allowances in the three tiers are sold or all qualified bids are fulfilled. Given the results from the sale of Tier 1 and Tier 2, the remaining Tier 3 bid lots and remaining bid guarantee amounts for each entity are:

- Entity A – 71 qualified bid lots at $56.51 with a remaining bid guarantee amount of $11,189,880.
- Entity B – 241 qualified bid lots at $56.51 with a remaining bid guarantee amount of $24,472,967.
- Entity C – 38 qualified bid lots at $56.51 with a remaining bid guarantee amount of $5,020,654

Table 5: Tier 3 Bid Fulfillment

Entity Name	Tier Price	Tier 3 Bid Lots	Remaining Qualified Tier 3 Bid Lots	Tier 3 Allowances Sold
A	$ 56.51	100	71	71,000
B	$ 56.51	300	241	241,000
C	$ 56.51	50	38	38,000
Total		**450**	**350**	**350,000**

Table 5 shows the results of the Tier 3 sale. Each entity has its entire Tier 3 qualified bid filled. Tier 3 qualified bids take into account any bid lots that were rolled down and fulfilled in Tier 2. Entity A's bid schedule shows a bid of 100 bid lots in Tier 3. However, 29 of Entity A's Tier 3 bid lots were sold allowances from Tier 2. Therefore, Entity A has 71 qualified bid lots remaining in Tier 3, and is sold 71 bid lots at the Tier 3 price.

Additionally, there are 650,000 allowances that will remain in Tier 3 of the APCR to be offered for sale in subsequent reserve sales. Table 6 presents the total number of APCR allowances sold from all three tiers and the total cost for each entity.

Table 6: Total Allowances Sold to Entities

Entity Name	Tier Price	Allowances Sold	Total Purchase Cost
A	$ 45.20	344,827	$ 15,586,180
A	$ 50.86	329,000	$ 16,732,940
A	$ 56.51	71,000	$ 4,012,210
Entity A Total		**744,827**	**$ 36,331,330**
B	$ 45.20	517,241	$ 23,379,293
B	$ 50.86	559,000	$ 28,430,740
B	$ 56.51	241,000	$ 13,618,910
Entity B Total		**1,317,241**	**$ 65,428,943**
C	$ 45.20	137,932	$ 6,234,526
C	$ 50.86	112,000	$ 5,696,320
C	$ 56.51	38,000	$ 2,147,380
Entity C Total		**287,932**	**$ 14,078,226**

Qualified bids can be evaluated in a roll-down procedure at one tier price, but cannot be considered for the roll-down procedure from the highest-price tier to the lowest-price tier. Take for example, a reserve sale in which 1,000,000 allowances are again sold within each tier. In this hypothetical reserve sale there are no qualified bids in Tier 1, 100,000 qualified bids in Tier 2, and 100,000 qualified bids in Tier 3. All 100,000 qualified bids in Tier 2 will be rolled down and sold at the Tier 1 price. However, even though Tier 1 will still be undersubscribed after this roll-down procedure, qualified bids will not roll-down from Tier 3 to Tier 1. The Tier 1 sale will close with the sale of 100,000 allowances.

The Auction Administrator then moves on to the sale of allowances in Tier 2. However, all qualified Tier 2 bids were fulfilled in the roll-down procedure leaving Tier 2 undersubscribed. This will trigger a second roll-down procedure, in which the 100,000 qualified Tier 3 bids will be rolled down and sold at the Tier 2 price. The Tier 2 sale will close with 100,000 allowances sold at the Tier 2 price. No qualified bids remain for the Tier 3 sale and the remaining 2,800,000 allowances (1,000,000 per tier across 3 tiers less 200,000 sold) will remain in the APCR.

Roll-downs can occur in the first two tiers of the reserve sale, while tiebreakers can occur in all three tiers. No entity in Example 3, 4, or 5 violated their holding limit or bid guarantee limitation. We now turn to examples that outline how exceeding bid

limitations can result in bid rejections to meet a bid guarantee or holding limits and alter the results of the reserve sale.

C. Applying the Holding Limit and Bid Guarantee

Example 6: Holding Limit Applied

The maximum number of allowances that can be held by any entity is a function of the holding limit and an entity's limited exemption. In this example, the available space within an entity's holding limit is defined as the maximum number of allowances that can be purchased by an entity at the reserve sale while in compliance with the holding limit. These allowances, denoted as 'Holding Limit Cap' in Table 7, indicate how many allowances a reserve sale participant may acquire before exceeding their holding limit.

The cap for each entity can be determined based on the holding limit, their limited exemption, and their current allowance holdings in the general holding and compliance accounts.

Table 7 outlines the holding limit cap calculation for the three entities given each entity has a limited exempion of 4,000,000 and presents the number of allowances that can be purchased at the reserve sale for each entity. Allowances purchased through the reserve sale are placed directly into the compliance account of an entity and are subject to the current vintage holding limit.

Table 7: Limited Exemption and Maximum Allowances that can be Purchased

Entity Name	Current Vintage Holding Limit	Limited Exemption	Compliance Account	General Holding Account	Holding Limit Cap
A	13,370,000	4,000,000	5,000,000[4]	11,370,000	1,000,000
B	13,370,000	4,000,000	5,000,000	11,370,000	1,000,000
C	13,370,000	4,000,000	6,000,000	10,670,000	700,000

Using the bid schedule in Table 1, this example presents the outcome of the reserve sale after imposing holding limit caps for all three entities.

[4] An entity may hold more allowances in its compliance account than its limited exemption. Any allowances in the compliance account in excess of the limited exemption will be subject to the holding limit. Allowances purchased through the reserve sale are always subject to the current vintage holding limit.

Table 8: Tier 1 with Holding Limit Cap Applied

Entity Name	Tier Price	Tier 1 Bid Lots	Qualified Tier 1 Allowances	Proportion	Tier 1 Allowances Sold
A	$ 45.20	500	500,000	0.34482759	344,827
B	$ 45.20	750	750,000	0.51724138	517,241
C	$ 45.20	200	200,000	0.13793103	137,932
Total		**1,450**	**1,450,000**	**1.00**	**1,000,000**

As shown in Table 8, the results of the Tier 1 sale are unchanged as no entity exceeded its holding limit violation. For example, Entity B has space for 1,000,000 allowances within the holding limit cap and its Tier 1 bid is only 750,000 allowances. Entity C is sold the residual allowance based on the random number draw (changing the number of allowances sold to Entity C from 137,931 to 137,932).

The number of remaining purchasable allowances for each entity is:

- Entity A – 655,173 remaining allowances that can be purchased.[5]
- Entity B – 482,759 remaining allowances that can be purchased.
- Entity C – 562,068 remaining allowances that can be purchased.

Table 9: Tier 2 with Holding Limit Applied

Entity Name	Tier Price	Tier 2 Bid Lots	Qualified Tier 2 Allowances	Roll-Down Tier 3 Allowances	Tier 2 Allowances Sold
A	$ 50.86	300	300,000	87,000	387,000
B	**$** 50.86	**500**	**482,000**	**0**	**482,000**
C	$ 50.86	100	100,000	31,000	131,000
Total		**900**	**882,000**	**118,000**	**1,000,000**

[5] After the Tier 1 sale, Entity A has 11,370,000 allowances in its general holding account and will have 5,387,000 allowances in its compliance account.

Table 9 shows that Entity B's scheduled Tier 2 bid of 500,000 allowances (500 bid lots) violates the holding limit as Entity B has a remaining holding limit cap of 482,759 allowances following the Tier 1 sale. Submitted bids that contain bid quantities in excess of the holding limit will be rejected, in bundles of 1,000 allowances, until the limit is met. Thus, only the portion of the bid that is in violation will be rejected, not the entire bid. In the Tier 2 sale, Entity B is sold 482,000 allowances, its maximum qualified Tier 2 bid.

The Tier 2 sale is undersubscribed with only 882,000 qualified Tier 2 allowance bids. As part of the roll-down procedure, the Auction Administrator checks Tier 3 submitted bids against the remaining holding limit and bid guarantee for each entity. The bid guarantee evaluation in the "roll-down" procedure is based on the tier price of the lower tier, in this case the Tier 2 price.

A total of 118,000 Tier 2 allowances remain available. In order to sell these excess Tier 2 allowances, qualified Tier 3 bid lots (satisfying both the holding limit and bid guarantee limitation) are assigned random numbers and ordered from lowest to highest number. As Entity B's Tier 2 bid violated the holding limit, it has no qualified Tier 3 bid lots. The 150 qualified Tier 3 bid lots of Entity A and Entity C are assigned random numbers. The 118 excess Tier 2 bid lots are sold to the Tier 3 bid lots with the lowest random numbers. In this example, Entity A is sold 87 lots and Entity C is sold 31 lots. The qualified Tier 3 bid for Entity A will then be reduced by 87 bid lots and the qualified Tier 3 bid for Entity C reduced by 31 bid lots as a result of the roll-down.

The total number of Tier 2 allowances sold and the resulting total cost for each entity is as follows:

- Entity A – 387,000 allowances at a total cost of $19,682,820.
- Entity B – 482,000 allowances at a total cost of $24,514,520.
- Entity C – 131,000 allowances at a total cost of $6,662,660.

The remaining allowances that can be purchased by each entity are:

- Entity A – 268,173 remaining allowances that can be purchased.
- Entity B – 759 remaining allowances that can be purchased.
- Entity C – 431,068 remaining allowances that can be purchased.

Table 10 presents the results of the Tier 3 sale. Entity B cannot participate in the final tier of the reserve sale as any additional purchase of a lot of 1,000 allowances would exceed the holding limit. Qualified Tier 3 allowances take into account any Tier 3 bid lots rolled-down and fulfilled in Tier 2. Entity A and Entity C have their entire Tier 3 qualified bids fulfilled. After all qualified Tier 3 bids are filled, there are 968,000 allowances that will remain in the APCR.

Table 10: Tier 3 with Holding Limit Applied

Entity Name	Tier Price	Tier 3 Bid Lots	Qualified Tier 3 Allowances	Allowances Sold
A	$ 56.51	100	13,000	13,000
B	$ 56.51	300	0	0
C	$ 56.51	50	19,000	19,000
Total		**450**	**32,000**	**32,000**

The reserve sale is complete after the Tier 3 sale. Table 11 shows the total number of APCR allowances and the total cost for each entity.

Table 11: Total Allowances Sold to Entities with Holding Limit Applied

Entity Name	Tier Price	Allowances Sold	Total Purchase Cost
A	$ 45.20	344,827	$ 15,586,180
A	$ 50.86	387,000	$ 19,682,820
A	$ 56.51	13,000	$ 734,630
Entity A Total		**744,827**	$ 36,003,630
B	$ 45.20	517,241	$ 23,379,293
B	$ 50.86	482,000	$ 24,514,520
B	$ 56.51	0	$ 0
Entity B Total		**999,241**	$ 47,893,813
C	$ 45.20	137,932	$ 6,234,526
C	$ 50.86	131,000	$ 6,662,660
C	$ 56.51	19,000	$ 1,073,690
Entity C Total		**287,932**	$ 13,970,876

Example 7: Bid Guarantee Applied

Assume for Example 7 that Entities A, B, and C have submitted the bid guarantee amounts outlined in Table 12 to correspond with their bid schedules presented in Table 1. For this example, all submitted bids are within the holding limit for each entity. The results of the sales from the three tiers of the reserve sale are now presented with the bid schedules presented in Table 1 and the bid guarantees in Table 12.

Table 12: Bid Guarantees

Entity Name	Bid Guarantee
A	$ 25,000,000
B	$ 67,000,000
C	$ 13,000,000

The results of the Tier 1 sale, shown in Table 13, are unchanged as there is no bid guarantee violation. Entity C is again awarded the residual allowance (changing the number of allowances sold to Entity C from 137,931 to 137,932).

Table 13: Tier 1 with Bid Guarantee Applied

Entity Name	Tier Price	Tier 1 Bid Lots	Qualified Tier 1 Allowances	Share	Allowances Sold	Total Purchase Cost
A	$ 45.20	500	500,000	0.34482759	344,827	$ 15,586,180
B	$ 45.20	750	750,000	0.51724138	517,241	$ 23,379,293
C	$ 45.20	200	200,000	0.13793103	137,932	$ 6,234,526
Total		**1,450**	**1,450,000**	**1.00**	**1,000,000**	

The total purchase cost of allowances and remaining bid guarantee amounts for each entity are:

- Entity A – $15,586,180 total purchase cost with a remaining bid guarantee amount of $9,413,820.
- Entity B – $23,379,293 total purchase cost with a remaining bid guarantee amount of $43,620,707.

- Entity C – $6,234,526 total purchase cost with a remaining bid guarantee amount of $6,765,474.

Given the bid guarantees in Table 12, the results of the Tier 2 sale change as the Tier 2 bids for Entity A exceed the value of the entity's bid guarantee limitation. Entity A can spend no more than $9,413,820; at $50.86 per allowance, it can therefore purchase no more than 185,000 allowances $9,413,820/$50.86 = 185,092 allowances, rounded down to the nearest thousand allowances). Therefore, Entity A's qualified Tier 2 bid is reduced to 185,000 allowances.

There are qualified bids for a total of 785,000 Tier 2 allowances. Tier 2 is undersubscribed with an excess of 215,000 Tier 2 allowances resulting in a roll-down procedure. Since Entity A does not have a sufficient bid guarantee amount remaining after the total purchase cost of $9,409,100, it has no qualified Tier 3 bid lots and cannot purchase any allowances through the roll-down procedure. Qualified Tier 3 bid lots (satisfying the holding limit and bid guarantee limitation) from Entity B and C are rolled down and sold the remaining Tier 2 allowances. The results of this Tier 2 sale are shown in Table 14.

Table 14: Tier 2 with Bid Guarantee Applied

Entity Name	Tier Price	Tier 2 Bid Lots	Qualified Tier 2 Allowances	Roll-Down Tier 3 Allowances	Allowances Sold
A	$ 50.86	300	185,000	0	185,000
B	$ 50.86	500	500,000	184,000	684,000
C	$ 50.86	100	100,000	31,000	131,000
Total		**900**	**785,000**	**215,000**	**1,000,000**

The total purchase cost of allowances in the Tier 2 sale and remaining bid guarantee amounts for each entity are:

- Entity A - $9,409,100 total purchase cost with a remaining bid guarantee amount of $4,720.
- Entity B - $34,788,240 total purchase cost with a remaining bid guarantee amount of $8,832,467.
- Entity C - $6,662,660 total purchase cost with a remaining bid guarantee amount of $102,814.

Entity A cannot purchase additional allowances from Tier 3 of the reserve sale as any additional purchase of a lot of 1,000 allowances at the fixed tier price would exceed the value of the entity's bid guarantee.

Table 15: Tier 3 with Bid Guarantee Applied

Entity Name	Tier Price	Tier 3 Bid Lots	Qualfied Tier 3 Allowances	Allowances Sold
A	$ 56.51	100	0	0
B	$ 56.51	300	116,000	116,000
C	$ 56.51	50	1,000	1,000
Total		**450**	**117,000**	**117,000**

Table 15 presents the results of the Tier 3 sale. Entity A has no qualified Tier 3 bid lots and thus is not sold any Tier 3 allowances. Entity B has 116 bid lots filled at $56.51. Entity B's bid schedule shows a bid of 300 lots in Tier 3. However, 184 qualified Tier 3 bid lots were rolled down to Tier 2, leaving only 116 qualified bid lots to be sold in Tier 3.

In the bid schedule, Entity C has a Tier 3 bid of 50 bid lots. However, 31 qualified Tier 3 bid lots were rolled down to Tier 2, leaving only 19 Tier 3 bid lots unfulfilled. However, Entity C only has 1 qualified Tier 3 bid lot, as the submitted Tier 3 bid of 19 bid lots violates the bid guarantee limitation ($102,814/$56.51 = 1,819 allowances rounded down to 1,000). Bids that exceed the value of the bid guarantee and exceed the holding limit will be reduced by bundles of 1,000 allowances until all bid limitations are met.

With the bid guarantees outlined in Table 12, 2,117,000 allowances are sold at the reserve sale and 883,000 allowances remain in Tier 3 of the APCR for sale at a later date.

Table 16 presents the total number of APCR allowances sold from all three tiers and the total purchase cost for each entity.

Table 16: Total Allowances Sold by Entity with Bid Guarantee Applied

Entity Name	Tier Price	Allowances Sold	Total Purchase Cost
A	$ 45.20	344,827	$ 15,586,180
A	$ 50.86	185,000	$ 9,409,100
A	$ 56.51	0	$ 0
Entity A Total		529,827	$ 24,995,280
B	$ 45.20	517,241	$ 23,379,293
B	$ 50.86	684,000	$ 34,788,240
B	$ 56.51	116,000	$ 6,555,160
Entity B Total		1,317,241	$ 64,722,693
C	$ 45.20	137,932	$ 6,234,526
C	$ 50.86	131,000	$ 6,662,660
C	$ 56.51	1,000	$ 56,510
Entity C Total		269,932	$ 12,953,696