Deposition Plate Sample Summary for Jordan High School Investigation

In connection with an ongoing investigation by South Coast AQMD enforcement staff, glass deposition plates were placed at six locations, including near Atlas Iron & Metal Co. and at Southeast Middle School (**Figure 1**), for the seven-day period of August 21 to August 28, 2020.

Materials collected on glass deposition plates can be screened to characterize airborne particles heavy enough to fall onto the plates and stay in place until retrieval. In general, which particles deposit on the glass plates and remain there until retrieval is dependent on several external factors, such as meteorological conditions, site conditions, and nearby activity. Therefore, particles detected are a representation of material that has been collected on the plate and may not be representative of all particles present in surrounding ambient air.

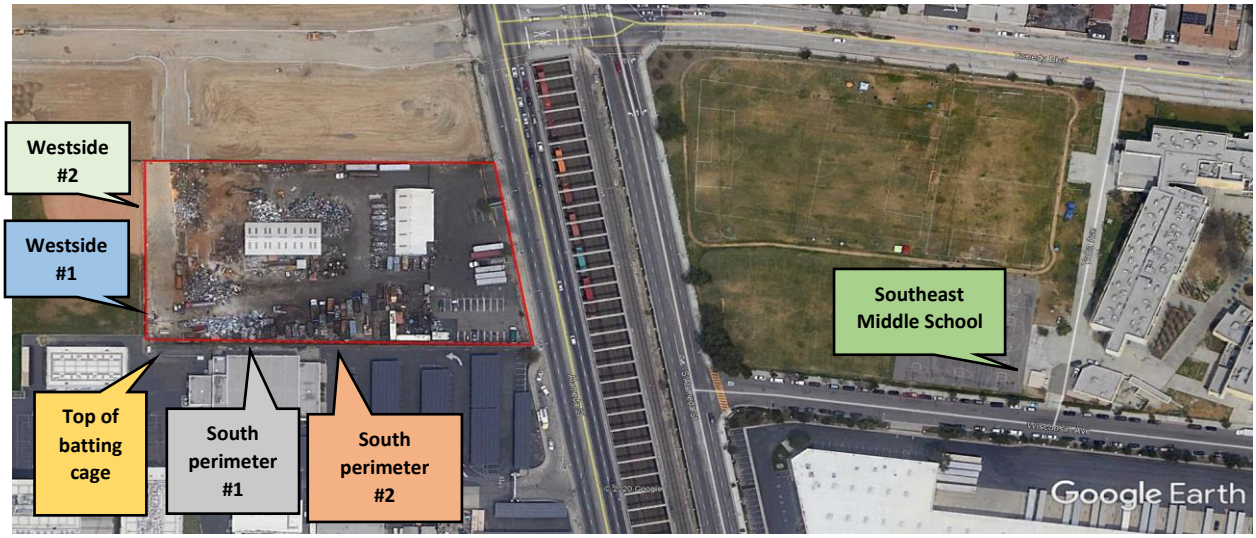

Figure 1. Locations of glass deposition plates

Two deposition plates were placed side-by-side at each location identified in Figure 1, one for each of two different screening methods. Particles deposited on one plate were screened for metals using Inductively Coupled Plasma – Mass Spectrometry (ICP-MS), and particles deposited on the second plate was screened for morphology and metal-containing particles using Scanning Electron Microscope – Energy Dispersive X-ray Spectrometry (SEM). ICP-MS is a sensitive analytical method which can be used to determine the presence and concentration of metals in a sample. SEM analysis is an effective screening tool that generates images of the particles which can be used to understand possible sources and is also capable of identifying metals present in individual particles.

Scope of Measurement Methods:

- Deposition sample results should only be used for qualitative purposes and cannot be used to determine the concentrations of metals (e.g. lead, nickel) in ambient air.
- These types of samples are not necessarily indicative of exposure.

Deposition Plate Sample Summary (cont'd)

Results Overview

Table 1. Summary of SEM and ICP-MS results (color-coded to match locations in Figure 1).

	SEM Results	ICP-MS Results																
Site	Metals Observed	Fe µg/g	Pb µg/g	Ba µg/g	Ni µg/g	Cr µg/g	As µg/g	Mn µg/g	Cu µg/g	Cd µg/g	K µg/g	V µg/g	Ti µg/g	Co µg/g	Zn µg/g	Sr µg/g	Mo µg/g	Sn µg/g
Southeast Middle School	Ti, Cr, Fe, Ni, Cu, Ba, Co	41,600	790	593	150	148	8.78	575	559	6.55	6,850	71.4	2,550	24.8	2,170	228	18.2	113
South Perimeter #2	Cr, Ni, Fe, Pb, Zn, Ba, S, Cu, Sn, Ti	48,800	284	723	202	175	9.84	649	1100	5.14	7,940	79.9	2,790	25.4	3,510	239	19.7	44.5
South Perimeter#1	Fe (minor component), Ba, S	Over Curve	334	800	273	266	11.8	694	762	15.2	7,160	69.7	2,300	30.3	4,020	199	28.2	49.0
Top of batting cage	Zn, Sr, Fe, Ba	38,500	196	640	85.4	91.3	8.16	568	590	2.61	8,370	82.1	2,860	17.3	3,050	239	14.5	27.2
Westside #1	Pb, Ba, S	35,400	237	513	158	125	8.11	493	535	4.04	7,880	57.4	2,040	15.2	2,850	391	23.6	22.1
Westside #2	Pb, Ca, S, Cr, Fe, Ni, Zn	56,400	316	937	282	167	10.1	762	947	5.06	7,660	69.1	2,580	48.7	4,080	341	34.4	69.4

Key Observations:

- Considerable components appearing on all plates were common silicates and rubber particles, indicative of dust and tire wear, respectively.
- All plates contained trace amounts of metals and metal particulates; however, the metals observed did not show a clear gradient between sampling locations (**Table 1**).
  - Caution must be used in interpreting these results. Metals, such as iron oxide, are present in soils, and the ICP-MS metals analysis results include the total amount of metals on the plate, not distinguishing between metal amounts from each individual source (soil, dust, debris, etc.).
  - The SEM image analysis can be used to distinguish metal particulates from soil particles by the brightness in which metal particles are observed with the SEM image along with the morphology of the metal particle versus mixed materials.
- Some metal-containing particles were observed that had morphology indicative of metal shavings (**Figure 2**).
- Lead was detected at all locations by ICP-MS and observed in individual particles at three of the six locations by SEM.
- Morphology and composition of lead-containing particles suggests the possibility of multiple sources (**Figures 3-4**)
- The glass plate located at Southeast Middle School and screened using SEM had a considerable amount of water spots and streaking. Water contamination can lead to particle removal or changes after deposition so results for this plate are subject to more uncertainty.

Deposition Plate Sample Summary (cont'd)

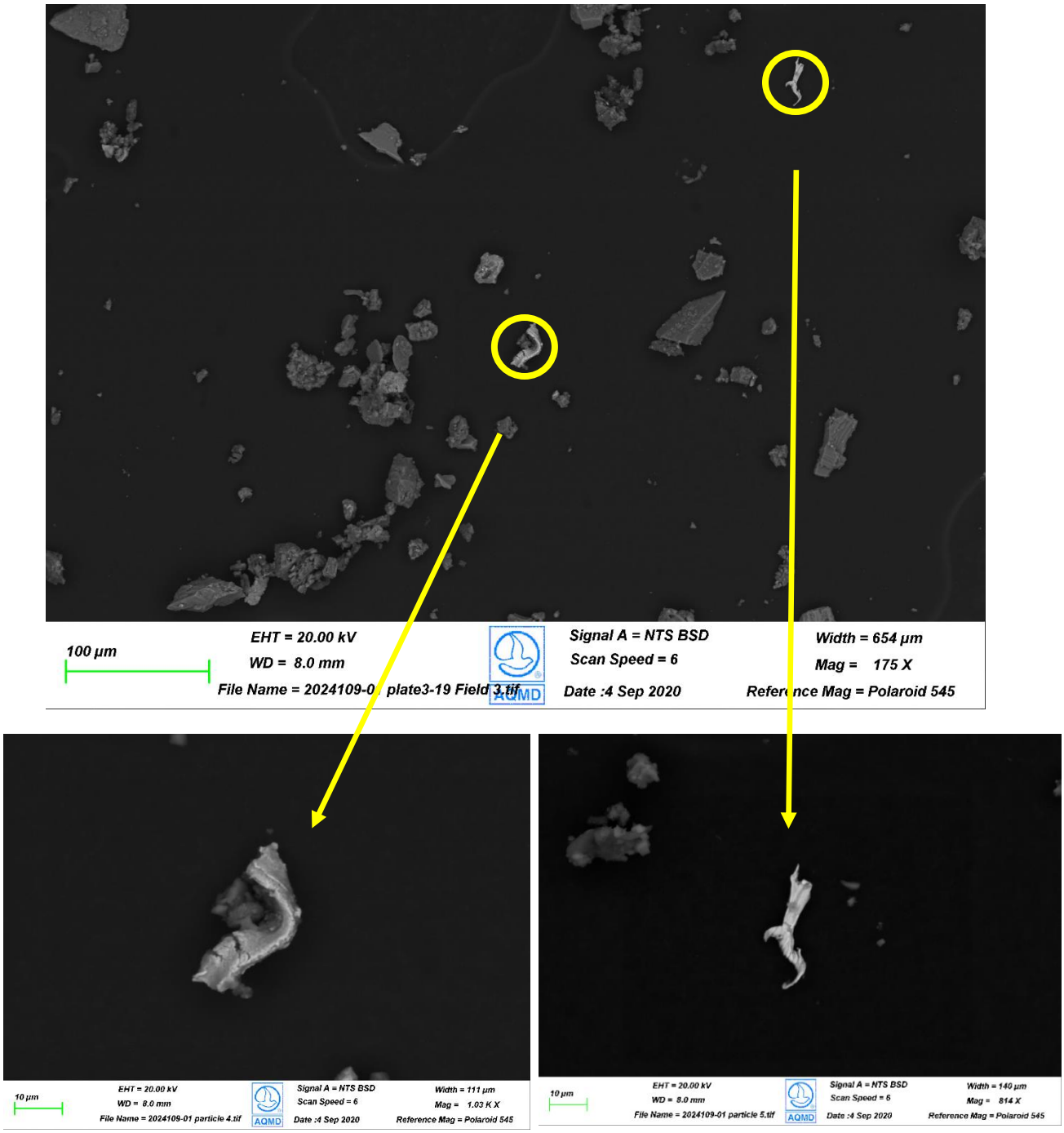

Figure 2. Southeast Middle School: Two metallic particles containing Cr and other metals. Composition, shape and surface texture resemble particle from metal grinding or shaving.

Deposition Plate Sample Summary (cont'd)

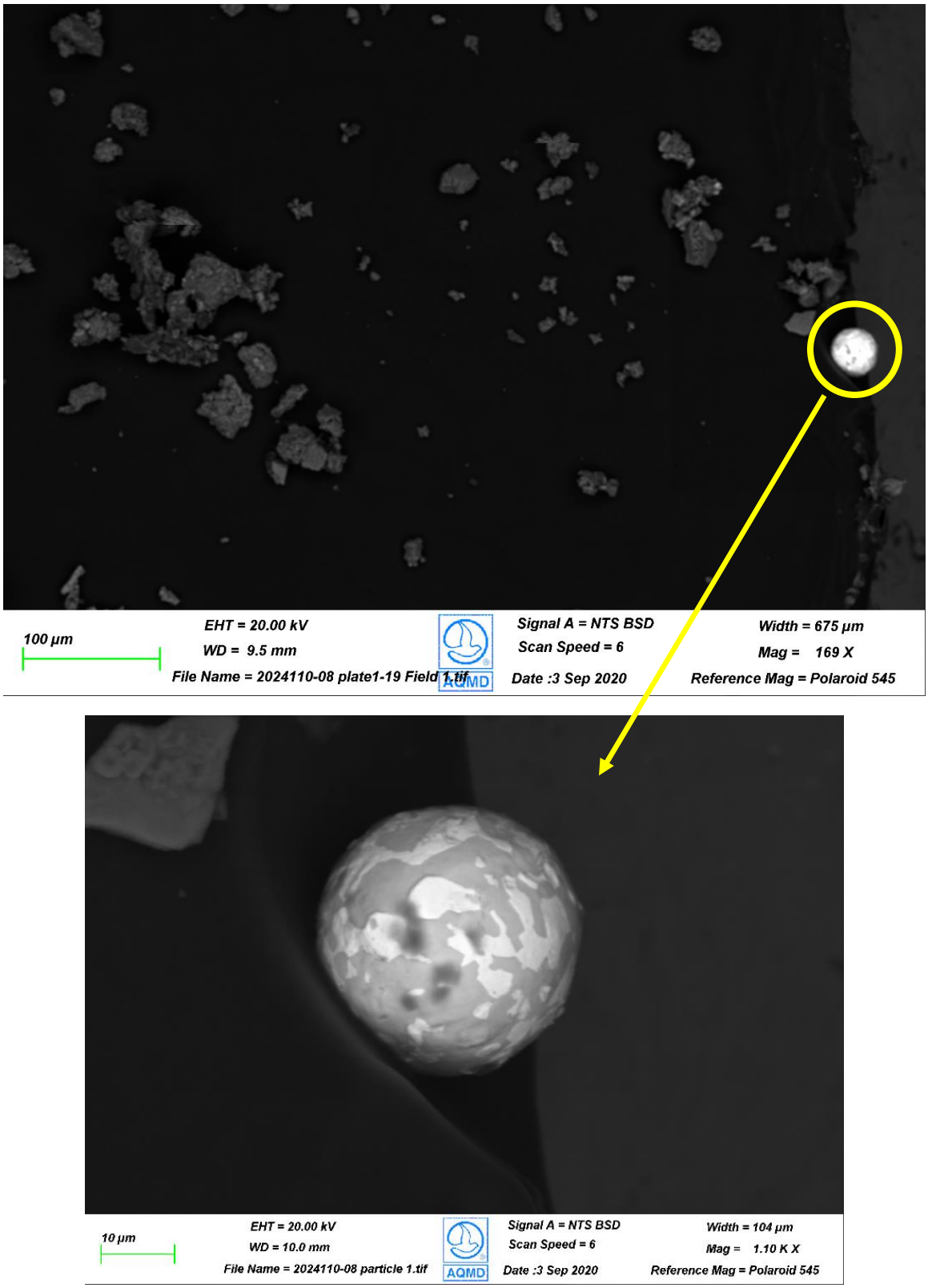

Figure 3. Westside #1: Spherical particle containing Pb and Sn. Composition, shape and surface texture resemble particle formed from a hot process such as soldering/welding.

Deposition Plate Sample Summary (cont'd)

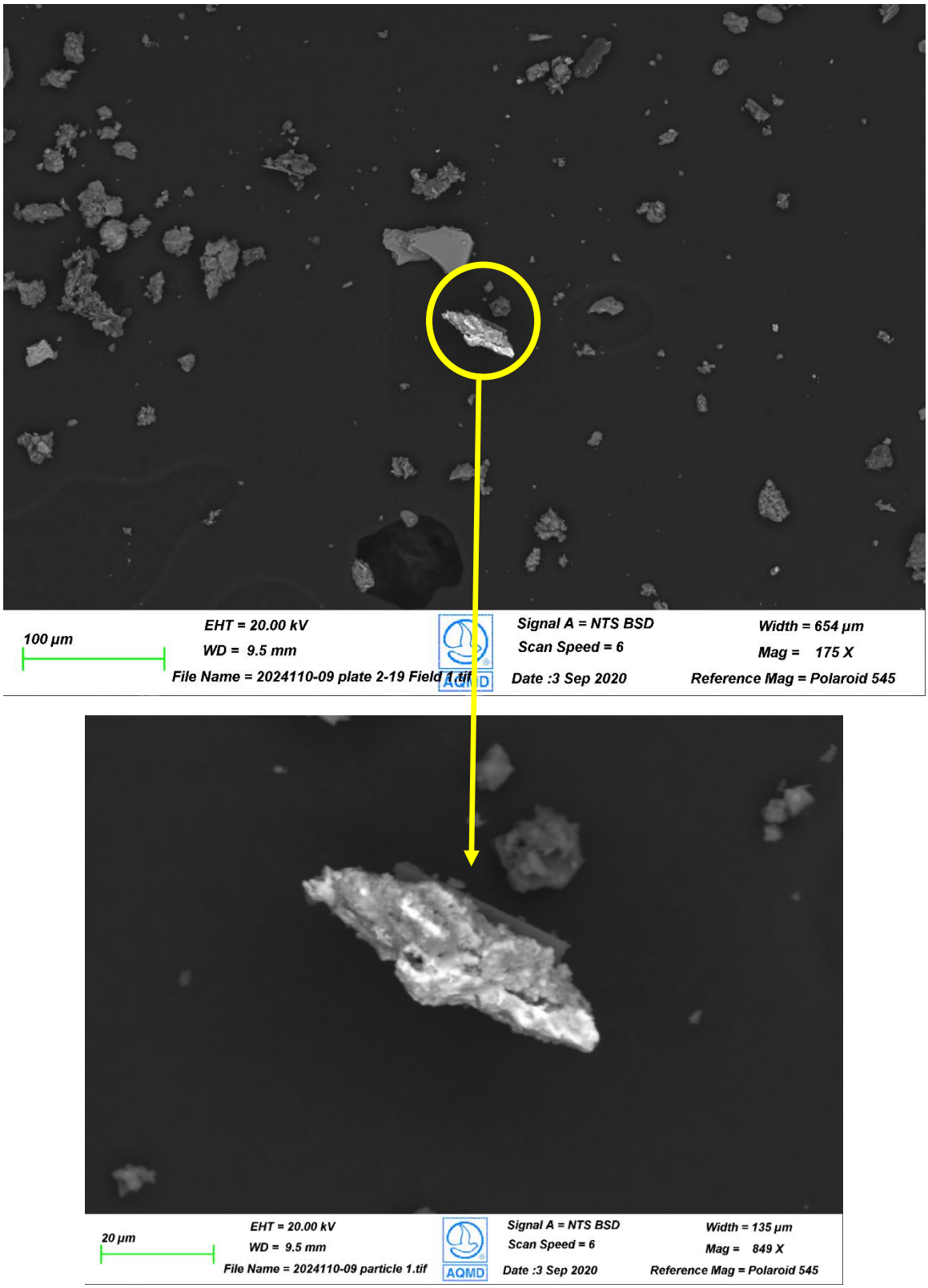

Figure 4. Westside #2: Amorphous Pb containing particle.